

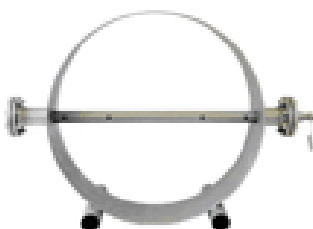
ITABAR-FLOW-SENSORS

Working acc. to the Differential Pressure Principle

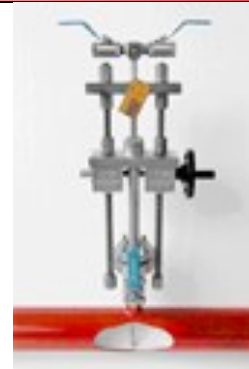
For Liquids, Gases and Steam



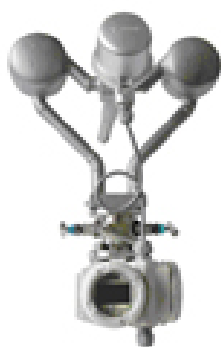
Itabar® type IBR
for gases and liquids



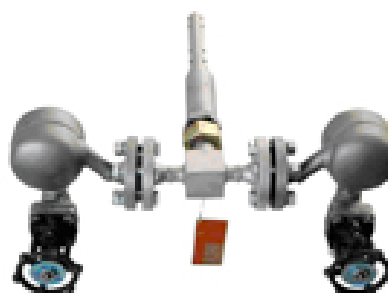
Itabar® type IBF-100
for flue gas applications



Itabar® type FTM
Installation and removal
under pressure



Itabar® type IBRD
for steam applications



Technical Catalogue

06/2025

THE EXPERT IN LEVEL AND FLOW

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ITABAR®-Flow-Sensor
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ITABAR®-FLOW-SENSORS

working acc. to the Differential Pressure Principle
for Liquids, Gases and Steam

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Itabar-Flow-Sensors

A. General Information

A.1 Introduction to Pitot-Tube Flow Measurement

Pitot tubes are classified as Differential Pressure sensors for flow measurement.

The measuring principle of the pitot tube utilizes the differences between the pressure ridge on the upstream side of a bluff body and the static pressure on its downstream side.

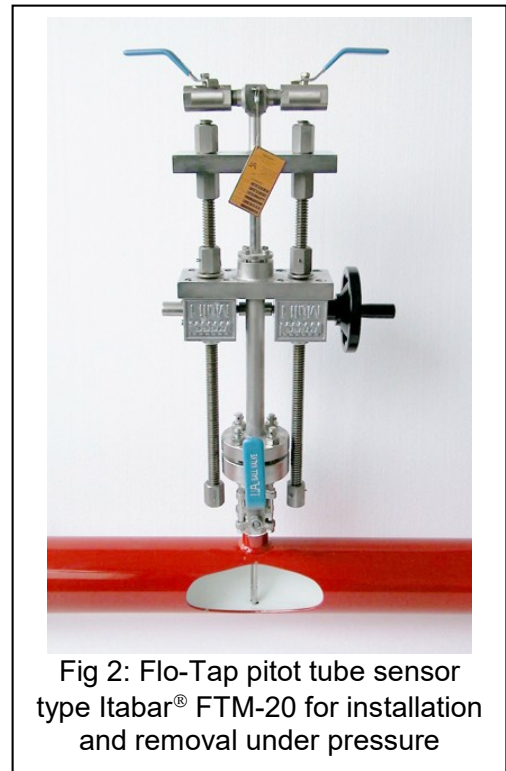
ITABAR-pitot tube sensors, see sample Fig 1, are mainly used to measure the volumetric flow of liquids, gases and steam in closed pipes ranging from ½" to 480" (DN 20 to DN 12000).

Examples of their applications are precise volumetric flow measurement in batch processes, continuous measurement of liquid ingredients in the process industry, fuel, air, steam and gases as primary energy source as well as in control functions requiring a high degree of stability and repeatability.

Exemplary in comparison to almost all other flow measuring instruments is the ITABAR-sensor's ease of installation. The installation consists of these steps: drilling of the pipe, weld-on-let is welded on to the pipe, ITABAR is inserted. Models Flo-Tap FT, see Fig 2, allow installation and removal without shutting the process down.

ITABAR-pitot tube sensors were developed with the goal of high reliability even under difficult conditions. ITABAR-pitot tube sensors are optimized in several ways with respect to fluid stream conditions. Advantages of the engineered sensor profile are their low permanent pressure loss as well as the consistent measurement accuracy over a wide range of Reynolds numbers.

For over two decades ITABAR-pitot tube sensors have been applied in the industrial world. Their exemplary reliability and excellent long-term use record resulted in broad acceptance by customers. Many measurements by independent institutes are testimony to the ITABA-sensor's high measuring accuracy



A.2 Measurement Principle of Itabar-Flow-Sensors

According to the continuity law derived by Bernoulli and the energy equation, the sum of the pressure energy and the potential and kinetic energy of a flowing fluid inside a pipe and in conditions of stationary and frictionless flow is the same at any time and in any part of the pipe

$$p_{stat} + p_{dyn} = const \quad (\text{Equation 1})$$

The factor p_{stat} is the static pressure equally distributed in all directions. The other term in the equation represents the dynamic pressure, effective in the flow direction, p_{dyn} .

For flowing fluids in horizontal pipes, with a small velocity compared to the Mach-number ($Ma \ll 1$), the dynamic pressure p_{dyn} of a fluid with a flowing velocity v , a density ρ and a resistance factor ζ is calculated as:

$$p_{dyn} = \zeta \frac{\rho}{2} v^2 \quad (\text{Equation 2})$$

Inserting a fixed body into a flowing fluid causes the flow to dam up immediately upstream of the body and to be completely zero at S2, see Fig 3. At this point the total pressure p_{S2} is:

$$p_{S2} = p_{stat} + p_{dyn} \quad (\text{Equation 3})$$

The ports of the sensor's downstream side are only affected by the direction-independent static pressure p_{stat} . The difference in both pressures, the differential pressure Δp , which is a function of the velocity with which the inserted body is impacted, see Fig. 4.

$$\Delta p = p_{S2} - p_{S1} \quad (\text{Equation 4})$$

Substituting Equation. 2 and 3 into 4 results in

$$\Delta p = \zeta \frac{\rho}{2} v^2 \quad (\text{Equation 5})$$

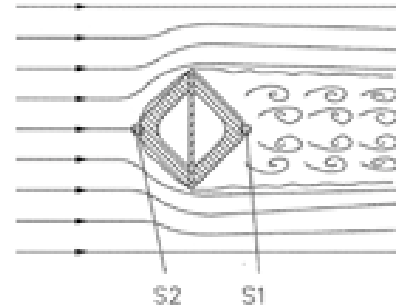


Fig 3: Schematic sketch fluid flow pattern at location

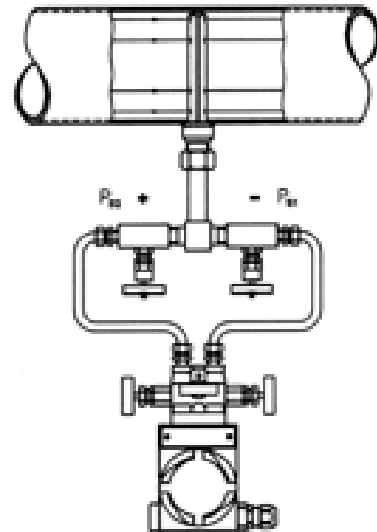


Fig 4: Schematic sketch of generation of differential pressure Δp

Itabar-Flow-Sensors

The volumetric flow can be calculated using the continuity law with a pipe area A and an average flow velocity. The following equations can be derived

Measured value	Formula for SI Units	Equation
Volumetric flow for gases under standard conditions	$Q_{vn} = k * 1,0159 * A \varepsilon \sqrt{\frac{2 \Delta p P_b Z_n T_n}{\rho_n T_b Z_b P_n}}$	6
Volumetric flow for gases under operating conditions	$Q_v = k * 1,0159 * A \varepsilon \sqrt{\frac{2 \Delta p}{\rho_b}}$	7
Mass flow for gases and steam	$Q_m = k * 1,0159 * A \varepsilon \sqrt{2 \Delta p \rho_b}$	8
Mass flow for liquids	$Q_m = k * 1,0159 * A \sqrt{2 \Delta p \rho_b}$	9
Volumetric flow for liquids	$Q_v = k * 1,0159 * A \sqrt{\frac{2 \Delta p}{\rho_b}}$	10

The following definitions apply :

	Dimension	Units in equations				
		6	7	8	9	10
Δp	Differential pressure at sensor profile	Pa	Pa	Pa	Pa	Pa
ρ_n	Medium density at standard conditions	kg/Nm ³	---	---	---	---
ρ_b	Medium density at operating conditions	kg/m ³	kg/m ³	kg/m ³	kg/m ³	kg/m ³
ε	Expansion factor	1	1	1	---	---
A	Cross sectional area of the pipe	m ²	m ²	m ²	m ²	m ²
D _i	Pipe inside diameter	---	---	---	---	---
k	k-factor	1	1	1	1	1
P _b	Operating pressure	Pa	---	---	---	---
P _n	Absolute pressure of gas at standard conditions	Pa	---	---	---	---
Q _m	Mass flow	---	---	kg/s	kg/s	---
Q _v	Volumetric flow	---	m ³ /s	---	---	m ³ /s
Q _{vn}	Volumetric flow at standard conditions	Nm ³ /s	---	---	---	---
T _b	Temperature of gases at operating conditions	K	---	---	---	---
T _n	Temperature of gases at standard conditions	K	---	---	---	---
Z _b	Real gas factor at operating conditions	1	---	---	---	---
Z _n	Real gas factor in standard conditions	1	---	---	---	---

The expansion factor needed to calculate the flow of gases and steam is computed as follows :

$$\varepsilon = 1 - \frac{\Delta p}{k(\dots)P_b} \left\{ \left(1 - \frac{2b}{\sqrt{\pi F}} \right)^2 0,31424 - 0,09484 \right\} \quad (\text{Equation 11})$$

Symbol	Variable	Units
ε	Expansion factor	1
Δp	Differential pressure at sensor profile	Pa
P _b	Operating pressure	Pa
k	Isotropic exponent of gases (also: ratio of specific temperatures of ideal gases)	1
b	Width of sensor profile perpendicular to flow direction	m
F	Cross sectional area of pipe	m ²

For example: for one-atom (two-, three-atom) gases the isotropic exponent k of the gas has a value of k = 1.66 (4 and 3). The width of the sensor profile perpendicular to the flow direction depends on the sensor type.

A.3 Required Fluid-Conditions

Pitot tube sensors, such as orifice plates, flow nozzle or venturi tubes are classified as flow measuring devices which utilize differential pressure to measure volumetric flow. The technical descriptions in (German) DIN 1952 „Durchflussmessung mit Blenden, Düsen und Venturirohren in voll durchströmten Röhren mit Kreisquerschnitt“ are analogue to pitot tubes:

- The fluid has to completely fill the pipe so that the measured differential pressure is representative of the volumetric flow. Fluids in partially filled pipes can only be measured if a full pipe can be arranged (e.g. by means of a siphon)
- The fluid must be single-phase. Two-phase fluids (e.g. water-air mixtures) cannot be measured.

$$Re = \frac{v_m d_i}{\nu} \quad (\text{Equation 12})$$

Meaning: the flow has to be sufficiently turbulent. Fluids of laminar nature cannot be measured with pitot tubes. Fluids may contain small particles or bubbles. The pressure generated in front of the sensor apertures causes a deflection of the particles or bubbles. Fluids which tend to crystallize will quickly plug the pressure tubes of the sensor and therefore cannot be measured with pitot tubes. Gases and gas mixtures containing dust can coat the sensor to an undesirable degree. To clean such dust deposits the air urge unit LSP (Fig 5) can be applied. This instrument will automatically flush out the sensor with air pressure in programmable intervals and durations. For flue gas mixtures a sensor version is recommended, which allows mechanical cleaning from both ends without having to take the sensor out of the pipe (see Fig 6).

In steam measurement applications condensate pots are used, inside of which a constant transition from steam to condensate and vice versa occurs. The pressure transfer is achieved via water columns.



Fig. 5: Air purge unit LSP for automatic cleaning of pitot tubes used in gas and gas mixtures containing dust or bubbles

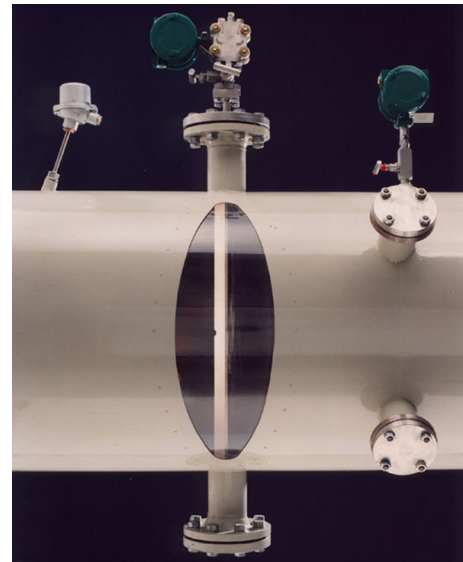


Fig. 6: Photo of sensor version IBF-100, designed specifically for flue gas measurement, installed in a (for demo purposes) transparent pipe. The sensor is accessible from both sides and allows mechanical cleaning without de-installation.

A.4 Advantages of Itabar-Flow-Sensors

A.4.1 Advantages in Comparison to Orifice Plates

a) Less Installation Cost

Compared to an orifice plate the ITABAR-sensor reduces material- and labor costs for the installation as well as operating expenses.

Part of the installation material costs of an ITABAR-sensor are the expenses for a weld boss and – depending on the sensor type – for a counter support fitting. The material costs for an orifice installation consist of two flanges and the necessary screws and hardware. The advantage in the ITABAR-sensors material costs are especially high for: large diameter pipes, pipe materials of exotic materials because of chemical compatibility issues, pipes for high pressure applications.

Labor costs for an ITABAR-sensor or orifice plate installation must include the wages for the welders. The installation of a weld boss requires – depending on the sensor type – a weld seam of approx. 10 cm (4"). The installation of a DN100 /4" (DN500/20") requires a weld seam of approx. 36 cm /14" (approx. 628"). The time needed to install an orifice plate is approx. 12 hours, as compared to approx. 1.5 hours for an ITABAR-sensor. The ITABAR-sensor in this case saves 10.5 labor hours.

The total savings in material- and labor costs which can be realized by using an ITABAR-sensor are at least 25% in a 4" pipe installation and at least 70% in a 20" pipe installation.

b.) Bi-Directional Flow Measurement

The profile of all ITABAR-pitot tube sensors is designed to be symmetrical to the plane between the pressure channels. This arrangement results in the same resistance values and thus the same k-factor with respect to the fluid properties during forward as well as reverse flow. The differential pressures generated by a given flow velocity are the same for flow in either direction. They only differ in the +/- sign

This constitutes an advantage over to the orifice plate, see Fig 7), which - because of its angled downstream corner – has different resistance values for forward and reverse flows. It would indicate widely different differential pressures for the same flow velocity in opposite directions.

The differential pressure measurement and processing can be accomplished with either one or two signal converters. The use of two signal converters is justified in cases requiring a high resolution or if separate signals are needed for forward and reverse flow.

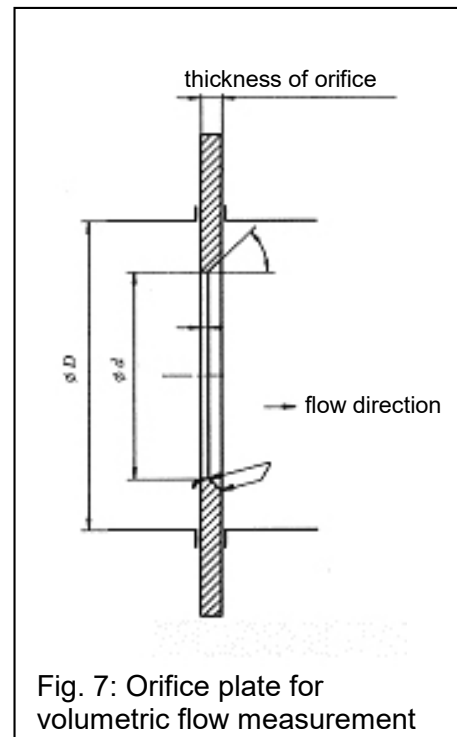


Fig. 7: Orifice plate for volumetric flow measurement

c.) Shorter Up/Down Straight Pipe Run Requirements

In order to increase the ITABAR-sensor's measurement accuracy the dynamic and static pressures are measured at four points along the sensor profile and averaged. A non-symmetrical flow profile thus has a smaller influence on the measured result. This leads furthermore to shorter up/down stream straight pipe run requirements. For example: The ITABAR-sensor requires 7 straight pipe diameters downstream of a 90°-bend. An orifice plate requires 10 to 46 times as much depending on the β ratio.

d.) Lower Permanent Pressure Loss

The sensor profile of the ITABAR-sensor is optimized with respect to the conditions of a flowing fluid and causes – in comparison to an orifice plate – a considerably smaller permanent pressure loss. The following application example is to illustrate this point: pipe size 10 inches (DN 250 PN 16); fluid: water; fluid temperature $T = 70\text{ }^{\circ}\text{F}$ ($20\text{ }^{\circ}\text{C}$); operating pressure $p = 29.4\text{ psia}$ (2 bar abs); volumetric flow $Q_v = 770\text{ GPM}$ ($175\text{ m}^3/\text{h}$) and average flow velocity $= 3.2\text{ FPS}$ (0.99 m/s).

Type	Ratio of diameters β	D/ mm	d/ mm	Diff. Pressure/ mbar	Pressure loss/ mbar	Ratio of perm. pressure loss vs differ. pressure / %	Required up stream straight pipe run after 90°-bend	Required downstream straight pipe run before 90°- bend
ITABAR IBR-25	---	250,4	---	12,48	1,36	10,9	7 x DN	3 x DN
Orifice plate	0,25	250,4	62,6	2874	2730	95,0	10 x DN	4 x DN
Orifice plate	0,3	250,4	75,1	1386	1247	90,0	10 x DN	5 x DN
Orifice plate	0,35	250,4	87,6	748	636	85,0	12 x DN	5 x DN
Orifice plate	0,4	250,4	100,2	439	351	80,0	14 x DN	6 x DN
Orifice plate	0,45	250,4	112,7	274	205	74,8	14 x DN	6 x DN
Orifice plate	0,5	250,4	125,2	180	126	70,0	14 x DN	6 x DN
Orifice plate	0,55	250,4	137,7	123	80	65,0	16 x DN	6 x DN
Orifice plate	0,6	250,4	150,2	87	52	59,8	18 x DN	7 x DN
Orifice plate	0,65	250,4	162,8	63	35	55,6	22 x DN	7 x DN
Orifice plate	0,7	250,4	175,3	47	23,4	49,8	28 x DN	7 x DN
Orifice plate	0,75	250,4	187,8	35,5	16	45,1	36 x DN	8 x DN

As this example illustrates it is possible to reduce the permanent pressure loss of an orifice plate by selecting the proper diameter-ratio $\beta = d/D$. The price to be paid for this is a considerable increase in longer straight pipe run requirements. The comparatively higher permanent pressure loss of orifice plates can be explained by their increased influence on the flow profile and related generation of eddy currents.

In summary: Compared to orifice plates pitot tubes have the advantage of causing considerably lower permanent pressure losses while generating useful differential pressures. A further advantage is the need for shorter up/down stream straight pipe requirements.

The ITABAR-sensor's lower permanent pressure loss reduces the energy- and thus operating costs of a measurement point considerably. In many applications the replacement costs of an ITABAR-sensor for an orifice plate are amortized within a very short time period

A.4.2 The Itabar-Sensor-Profile

a.) Design Advantages for Flow Measurement

Unique Sensor Profile

The design of the ITABAR-sensor profile, see Fig. 8, is optimized with respect to fluid flow properties, and meets the technical challenges of accurate measurement as well as static and sensor-oscillating problems. It represents a step forward in technical development.

Excellent Linearity

A significant improvement in the sensor design with respect to the fluid properties is the shape of the sensor profile. The fluid separation takes place at the same spot on the sensor over a wide range of Reynolds numbers, which results in minimal Reynolds number dependency. This specially designed ITABAR-sensor profile achieves excellent linearity over a wide measuring range.

Exemplary Reproducibility

The form design of the sensor profile not only improves the linearity but also the reproducibility of the measurement in cases of averaging within certain time intervals. The result is especially positive with shorter time intervals.

Superior Averaging

In order to reduce the influences of in most cases less than ideal flow profiles, the differential pressures representing the local flow velocities are measured at four points, averaged and processed. Each of these four measuring points has pressure sensing apertures located opposite from each other. The positioning of these pressure apertures is designed for fluid flow profiles as they are encountered in real applications.

b.) Large Pressure Ports and Pressure Channels

Large diameter pressure sensing ports and pressure channels allow the long term uninterrupted use even in contaminated fluids. Condensate in form of drops can more easily flow off through the larger areas. A mechanical blockage of the pressure channels through condensate drops is thus eliminated. The table below lists the characteristic dimensions depending on the type of sensor.

	Sensor Type				
	15	20/21	25/26	35/36	65/66/100
Width of profile transverse to flow	11 mm	12 mm	25,4 mm	42 mm	56 mm
Height of profile in flow direction	10,5 mm	11 mm	23 mm	36 mm	50 mm
Diameter of pressure sensing ports	4 mm	4 mm	8,5 mm	10 mm	16 mm
Cross sectional area of pressure channel	28 mm ²	14 mm ²	62 mm ²	78 mm ²	113 mm ²



Fig. 8: Sensor profile of pitot tube model 35/36 in a cut-away view to illustrate the two pressure channels near the pressure ports..

c.) Very Good Mechanical Stability

The mechanical stability in situations of static and dynamic stress to the sensor profile is one of the most important criteria in the constructive design of the sensors.

The dislodging of a one-side mounted sensor profile through static stress caused by the flowing medium is inversely proportional to the 2nd degree axial area-momentum of the sensor.. For this reason the ITABAR-pitot tube sensor is designed with a very high 2nd degree axial area-momentum. Similar arguments are valid for a sensor's resonance-frequency oscillations, which are determinant for dynamic stresses.

Commercially available pitot tubes made of only 1 mm thick stainless steel sheet metal have a low 2nd degree axial area-momentum. The mechanical stability of such thin-sheet sensors under static and dynamic stresses is lower compared to the ITABAR-sensor (e.g. as shown in Fig 8).

d.) Itabar®-Sensors are better than any Cylindrical Sensor

Pitot tube sensors with a cylindrical sensor profile do not belong to the same class as ITABAR pitot tube sensors. The differences lie in the form and design of cylindrical sensors.

A typical cylinder-shaped sensor consists of a thin walled pipe with four sensing ports to measure the total pressure and one sensing port to measure the static pressure. The static pressure is lead to the outside via a thin piece of pipe located inside the sensor profile.

The main disadvantages are measurement inaccuracies and poor reproducibility. The reasons for this are a weakly defined technical relationship to fluid flow properties and thus a Reynolds number dependence. Contrary to a sharp-edged sensor profile design the fluid separation point is not fixed on the sensor (see Fig 9). As a result the resistance value c_w is very much Reynolds number dependent, see Fig. 4.4. A sensor's k-factor is derived from its resistance value as follows:

$$k = \sqrt{\frac{1}{c_w}}$$

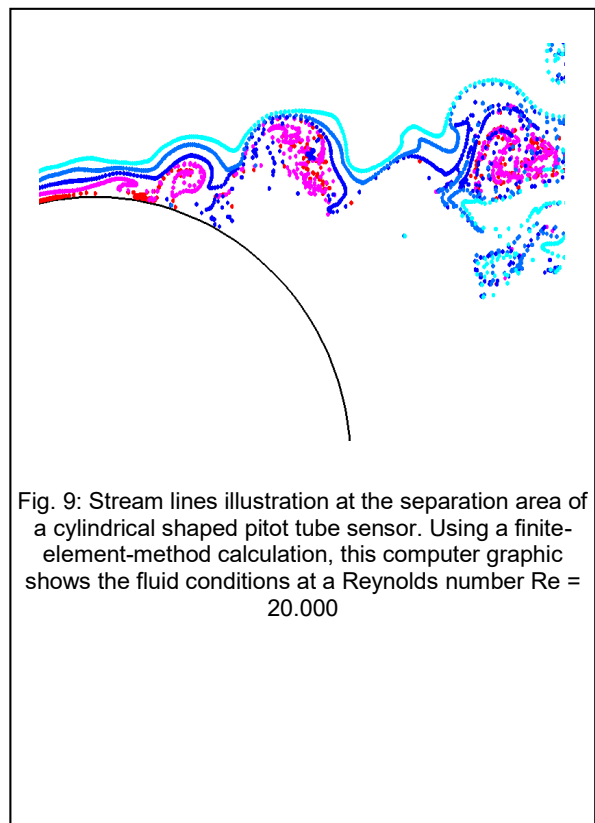


Fig. 9: Stream lines illustration at the separation area of a cylindrical shaped pitot tube sensor. Using a finite-element-method calculation, this computer graphic shows the fluid conditions at a Reynolds number $Re = 20.000$

Itabar-Flow-Sensors

For example a 10% change in the k-factor causes a change in the measured volumetric flow value of also 10%. For this reason a k-factor dependence on Reynolds numbers is not desirable.

Further disadvantage of cylindrical sensors is their lack of mechanical stability and their inaccurate performance in bi-directional flow measurement.

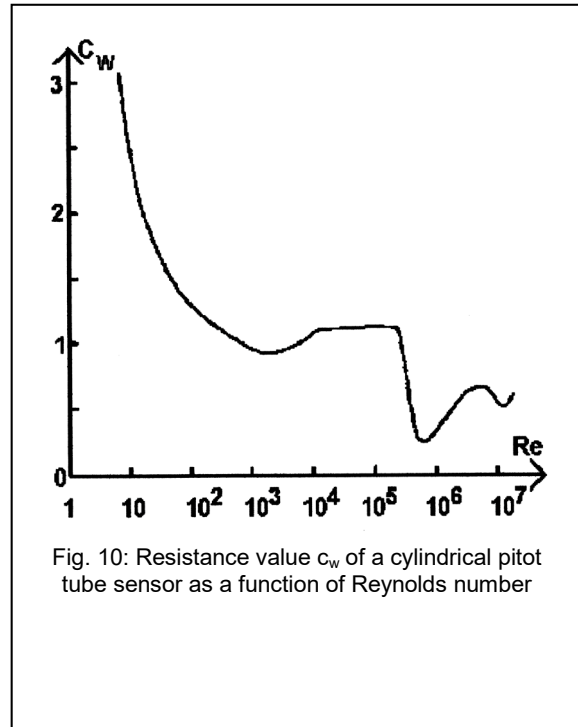


Fig. 10: Resistance value c_w of a cylindrical pitot tube sensor as a function of Reynolds number

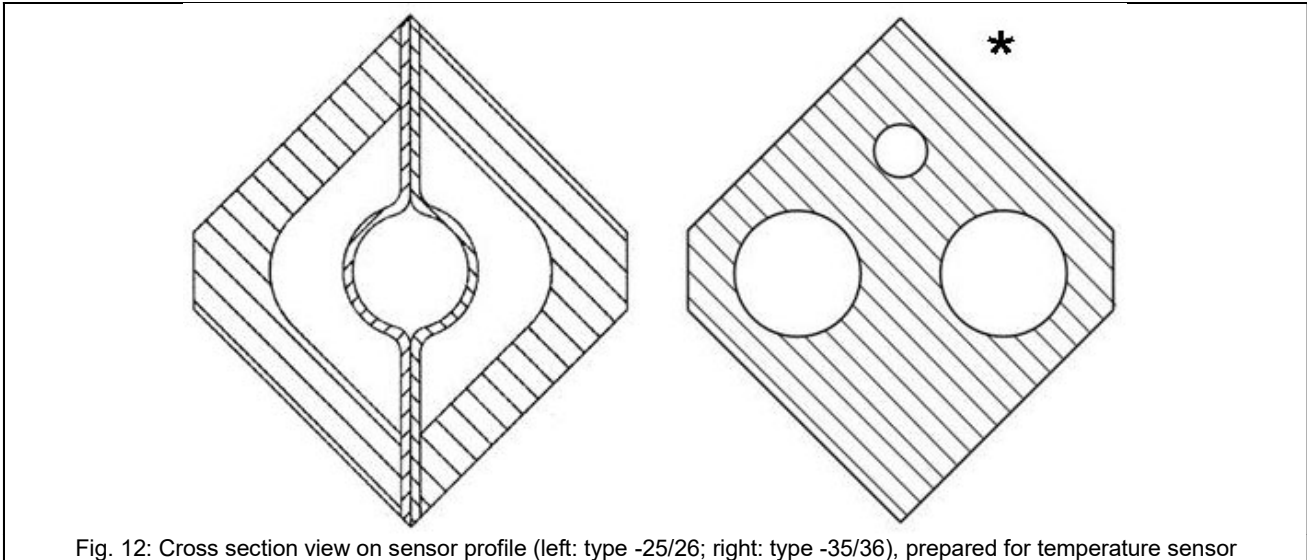
e.) Sensor Profile with Integrated RTD resistance thermometer

In order to measure the fluid temperature all Itabar-pitot tube sensors – excepting IBFD-HT and IBFD-HTG – can optionally be equipped with a RTD resistance thermometer (profiles -20/-21: thermocouple type K), see Fig. 11. The advantages of the selected thermometer are as follows:

- The resistance thermometer is rod shaped, of rugged design for long-term use.
- The 316SS-tube provides a reliable protective cover for the resistance thermometer.
- The design is made with long-term reliable components for industrial applications with increased demands on the material.
- The temperature sensor is of 3-wire design in order to reduce the effective wire resistance.
- The standard resistance thermometer is usable in a temperature range from -100 to +450 °C.



Fig 11: Pitot tube sensor type IBR with integrated RTD. Right side: opened junction box



The constructive solution to insert the RTD is unique and convinces with the following advantages:

- The RTD is inserted into the sensor profile (Fig. 12, cross sectional view of sensor profile for RTD assembly) This design avoids the RTD to be wetted, also it is not exposed to operational pressure.
- This design, in combination with the rod-shaped RTD-design, allows easy and quick installation and removal under pressure.

The temperature sensor is placed in the sensor axis in-between the two pressure channels. After thermal equalization in the RTD's environment it measures the fluid temperature along the pipe axis.

*Drawings not dimensional

A.4.3 Patented Itabar-Sensor Series Flo-Tap

a.) Retroactive installation under operational conditions

The current level of technical development allows only a few flow measurement devices to be installed retroactively, when a process interruption is expensive and to be avoided. Some criteria to be considered as part of the flow meter selection process are: the type of fluid to be measured, the desired measurement accuracy as well as purchase and installation costs. The following table compares several competing flow metering technologies, which can be installed under pressure, with respect to these criteria:

Flow Measurement Instrument	Applicable fluids	Method applied to read average flow velocity	Accuracy	Purchase costs	Installation costs
Pitot tube sensor ITABAR, series Flo-Tap	Liquids, gases, steam	Averaging of four flow representative locations	± 1 % of rate	low	medium
Non intrusive ultra sound sensors (transit time)	Liquids with air- or gas content of < 3 Vol. %	Averaging along the ultrasonic beam between ultrasonic sensors	$\pm 1-3$ % of rate	high	low
Non intrusive ultra sound flow sensor (Doppler)	Liquids with evenly distributed air-, gas- or particles	Averaging along narrow ultrasonic beam	± 1 % of rate	medium	low
Electro-magnetic sensors (insertion type)	Liquids with conductivity > 5 μS	Localized measurement in vicinity of sensor electrodes	$\pm 2-3$ % of rate	low	medium

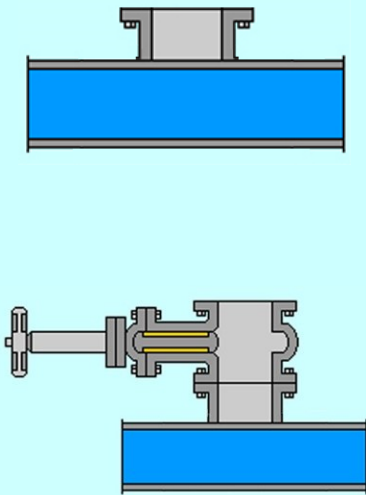
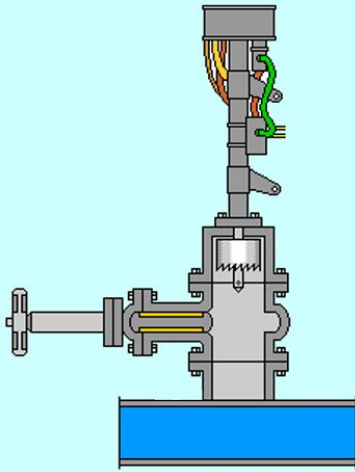
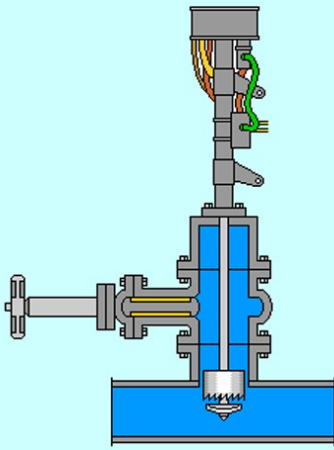
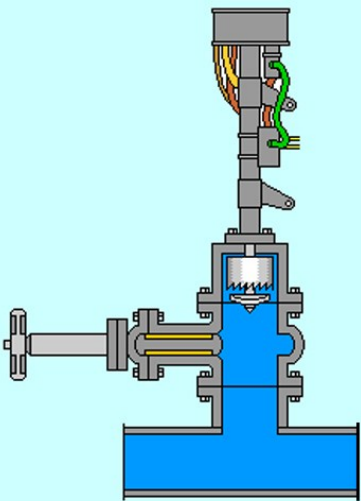
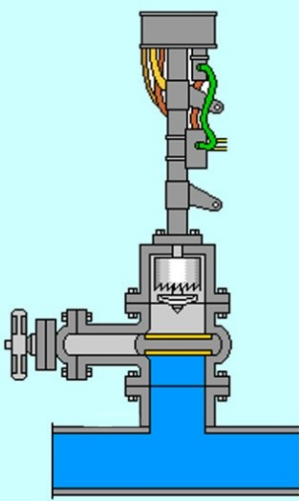
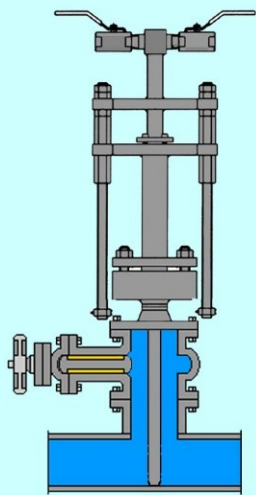
For many applications, which require an under-pressure installation, the ITABAR pitot tube series Flo-Tap is the first choice. A retroactive Flo-Tap-sensor installation under pressure is done in the following steps:

1. Welding of the assembly stud with assembly flange to the pipe, see Fig. 13a.
2. Assembly of isolation valve to the assembly stud, see Fig. 13a lower picture.
3. Installation of the tapping tool, see Fig. 13b.
4. Drilling of the pipe, see Fig.. 13c.
5. Withdrawal of the tapping tool, see Fig. 13d.
6. Closing of isolation valve and removal of tapping tool, see Fig. 13e.
7. Assembly of Flo-Tap pitot tube sensor, opening of isolation vale and insertion of flow sensor profile, see Fig. 13f.

b.) Removal without process shut-down (Flo-Tap)

All Flo-Tap versions of the ITABAR-sensor allow the removal under pressure. These features are valuable in applications requiring

- a periodic check of the flow sensor's measurement accuracy
- an exchange after extended service in abrasive fluids or
- cleaning during normal maintenance operations

		
Fig. 13a: Welding of mounting stud with mounting flange to the pipe (upper picture) and mounting of the isolation valve to the mounting stud (lower picture)	Fig. 13b: Mounting of the tapping tool	Fig. 13c: Drilling the pipe
		
Fig. 13d: Pull back of tapping tool	Fig. 13e: Closing of isolation valve and removal of tapping tool	Fig. 13f: Mounting of the FloTap-Sensor, opening of the isolation valve and insertion of the pitot tube sensor

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c.) Safe operation with second packing gland

The current level in technical design of Flo-Tap pitot tube sensors is marked by one packing gland on the far end of the process isolation valve (see Fig 14). This type of construction can lead to accidents in practical installations.

Pitot tubes are often subjected to mechanical stresses with static and dynamic components under varying operating conditions. The forces impacting on the sensor profile can cause irregular or resonant oscillations. Depending on the amplitude and the frequency of this stress the material can weaken and the sensor can break.

For this reason a pitot tube sensor profile with only one single packing gland and because of its unsupported length is in danger of being damaged.

In order to avoid such accidents all ITABAR® Flo-Tap-sensors are equipped with two packing glands (see Fig 15). This measure increases a sensor's resonant frequency by such a magnitude that the material cannot easily weaken even in severe operating conditions.

Intra Automation GmbH has this design patented and is the only manufacturer of pitot tube which are equipped with a second packing gland.

ITABAR® models FTM, FTH, FTMD and FTTH are all equipped as standard with a pair of threaded rods (mat 316 SS) (see Fig. 15). A wrench is required to remove and install the sensor. The removal/installation is made faster and easier with a threaded wheel. The housing is made of aluminum, the wheel of carbon steel.

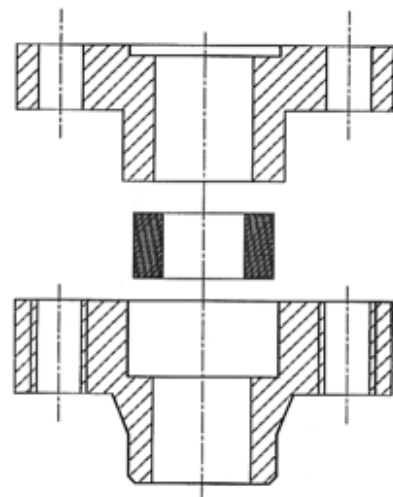
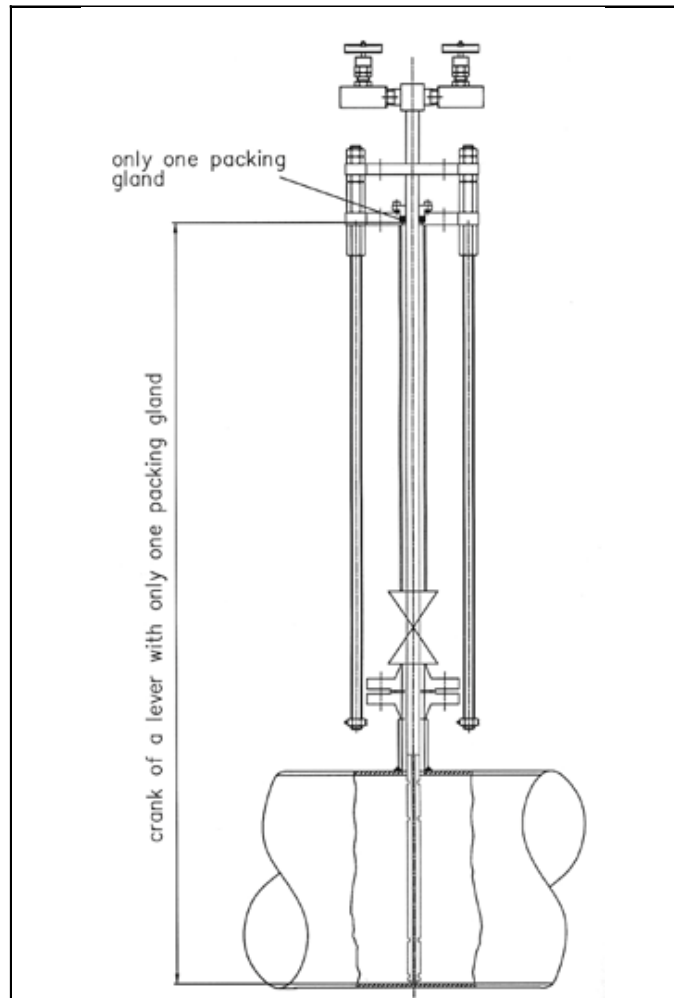
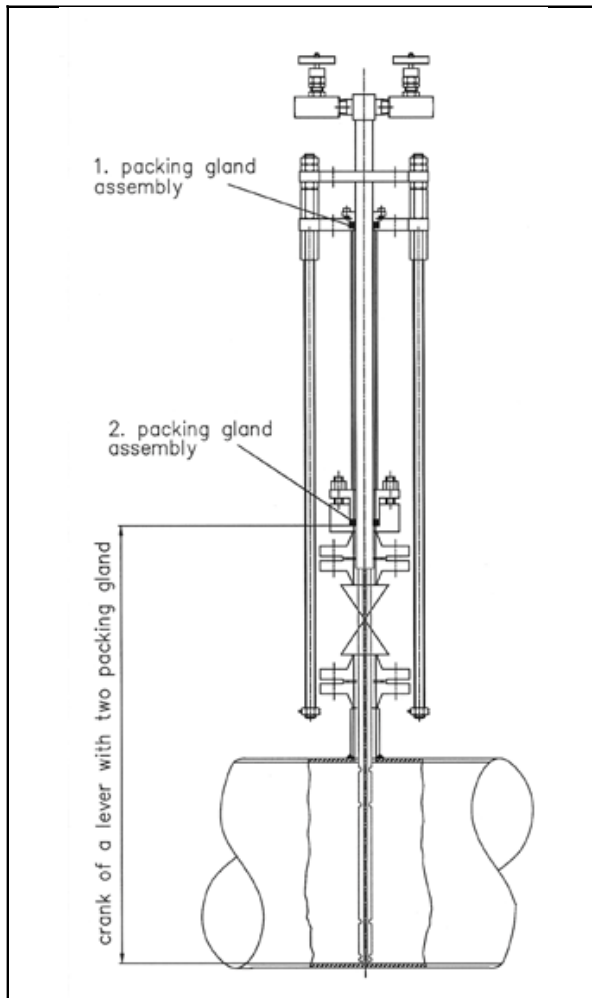


Fig. 14: Itabar-Flo-Tap-Sensor with second packing gland

d.) Construction of Wet-Tap Pitot Tubes



Flow Direction

Fig. 15: ITABAR pitot tube with two packing glands. The short leverage practically eliminates the danger of the sensor breaking.

Fig. 16: Conventional pitot tube without prevention of material weakening. The long leverage increases the likelihood that the sensor might break

Itabar-Flow-Sensors

A.5 Specification Sheet for Itabar-Flow-Sensor

The selection of the proper pitot tube sensor can be made quickly and reliably by this manufacturer if the operational data about the existing pipe line, the fluid and the desired version are made available according to the table below.

General Information:

Client:	
Reference-No.:	
TAG-No.:	

Pipeline:

Material:		Nom. pressure		psi g	
Pipe inside diameter		Inch	Wall thickness		Inch
Wall thickness insulation		inch			

Fluid:

Name		liquid	☐	steam	☐	gas	☐
Isentropic exponent:							
Compressibility factor:							
Pipe run:		horizontal	☐		vertical	☐	
Flow direction::		from right to left	☐		from left to right	☐	
		upwards	☐	downwards	☐	bi-directional	☐

Physical value	Min.	Operation	Max.	Unit
Flow:				
Temperature:				
Pressure; abs. ☐ rel. ☐				
Standard density:				
Operational density:				
Dynamic viscosity:				

Requested version:

Special pipe assembly with threaded weld-o-let:	☐
Special pipe assembly, flanged version:	☐
	- DIN-Flanges: ☐
	- ANSI-Flanges: ☐
Wet-tap version of Itabar-sensor required:	☐
Compact version (if technically possible):	☐

Please take a copy, fill it in and send it to: info@intra-automation.de.

A.6 Specification of Pitot-Tube-Sensors

Specifying a pitot tube sensor starts with the selection of a fitting version for a specific application

For a better understanding the meaning of the sensor-version nomenclature will be explained in the following. Pitot tube sensors which start with the letter „IB..“ are designed for fixed (installation not under pressure) installations. The letter „R“ („F“, „G“) indicates a threaded (flanged, welded) process connection between the pipe and the sensor's assembly components. All sensors, which are used to measure steam have the letter „D“ at the end of the model name. The additions „HT“ or „HTG“ stand for „High Temperature“. Pitot tube sensor series „Flo-Tap“ is indicated by the letter „FT“ at the beginning of the model name. They can be installed and removed under pressure conditions (wet-tap design). The letters „N“ („M“, and „H“) signify their possible use in low („N“) and medium and high operating pressure applications, with „D“ for steam use. Model series 21, 26, 36 and 66 differ from series 20, 25, 35 and 65 in that they come with a counter-end support, which serves to avoid mechanical stress caused by high flow velocities and high impact pressures or sensor-resonance oscillations.

Chapters B.1.1 and C.1.1 cover in detail the selection criteria for the various ITABAR- sensor model series, depending on the specific operating pressure, operating temperature and the desired assembly and installation design.

The WINFLOW sizing and model selection program serves to calculate and configure a pitot tube sensor. The WINFLOW program (program window see Fig 17) calculates the following as a function of the parameters for a specific measurement point:

- the differential pressures generated under varying operating conditions,
 - the permanent pressure loss caused by the sensor,
 - the sensor resonance and – if need be – it recommends a sensor with counter support,
 - the sensor oscillating frequency at operating conditions,
- the maximum allowable differential pressure,
- the maximum allowable flow for the selected sensor,
- the average flow velocity and
- the viscosity and density of commonly measured fluids under operating conditions.

The screenshot shows the 'WinFlow 2.5 vom 16.02.99' window. It has a menu bar with 'Datei', 'Bearbeiten', 'Kopiedaten', and 'Parameter'. The main area contains several input fields and dropdown menus. The 'Berechnungsart' dropdown is set to 'Volumenstrom Gase (Betriebsbedingung)'. 'Medium' is 'Luft'. 'Druck' is '5.00' bar (abs). 'Temperatur' is '45.00' °C. 'Dichte' is '0.0000' kg/Nm3. 'Viskosität' is '0.0000' mPa s. 'QMax' is '12.500.00' m3/h. 'QNorm' is '10.000.00'. 'QMin' is '2.500.00'. 'Rohrinnendurchmesser' is '354.000' mm. 'Wandstärke' is '6.4' mm. 'Kanalforn' is 'rund'. 'Rohrleitungsverlauf' is 'vertikal'. 'Typ' is '25'. 'Sensor' is 'IBR'. 'Material' is '1.4571 / X6 CrNiMoTi 17 12 2'. There are also buttons for '?', 'D/E', and a 'D/E' button at the bottom right.

Fig. 17: The program window of WINFLOW

The WINFLOW program can be ordered at no charge by any customer and in the desired format. The selection process can also be done by this manufacturer if the customer has furnished all required information mentioned in chapter 5 „Specifications for ITABAR flow Sensors.

The order specifications are selected via a simple to use order specification key, which has the same format for all sensors and which shows the variety of the in modules constructed versions. It enables a sensor specific selection for almost any application.

Itabar-Flow-Sensors

A.6.1 Compact or Separate Version?

The compact or the separate versions describe the assembly of the sensor components. In the compact version the pitot tube sensor, a separate 3-or 5-way manifold and a transmitter are assembled together into one compact unit (see Fig 18). In the separate version the transmitter and the sensor are separated from each other and are connected via conduit-pipes, (see Fig. 19).



Fig. 18: Example of a compact version with flange plate, 3-way manifold and DP transmitter



Abb. 19: Example of a separate version with 3-way manifold and DP transmitter

The compact version (see Fig 18) offers obvious cost advantages compared to the separate version (see Fig 19). Assembly- as well as material expenses are eliminated for:

- ◆ two ball valves
- ◆ two conduit fittings
- ◆ one mounting bracket for the DP transmitter
- ◆ the fixed conduit and
- ◆ two conduit fittings on the DP transmitter
- ◆ assembly time

A.7 Calibration of the Itabar-Flow-Sensor

In order to achieve the highest accuracy for the ITABAR-flow-sensors, they were tested on a PTB tested and approved calibration facility. The objective was to determine the absolute measurement error at minimum as well as maximum flow.

The measuring turn-down was 1:5, the Reynolds number influence was to be determined and to be integrated into the Winflow Program, so that the user can demand the highest performance from the product.

Tested pipe diameters inches (mm)	Sensor type
ID 12.047 (306 mm)	IBF-26/36/66
ID 15.748 (400 mm)	IBF-26/36/66
ID 19.685 (500 mm)	IBF-26/36/66
ID 23.543 (598 mm)	IBF-26/36/66
ID 39.291 (998 mm)	IBF-26/36/66
ID 63.307 (1608 mm)	IBF-26/36/66

Intra-Automation manufactured several different pieces of pipe for these tests, which could be inserted into the hydraulic test stand. The pipe-layout was measured with a tolerance of + 1 mm.

The conversion from the differential pressure into a mA signal was done with a DP transmitter manufactured by Endress + Hauser, which was calibrated + 0,1 % of full scale.

The water temperature and the pressure were read at the calibration stand. The output signal of the electrical DP transmitter was transmitted in the form of pulses to the ABB computer and were compared directly with the calibration standard values.

Six measurements were automatically taken at every flow range in intervals of 100 seconds. The measurement errors at each interval were averaged.

With the help of these calibrations it was possible to reach an accuracy of + 0,3 % for all ITABAR-sensors. In the ongoing manufacturing process the width of all sensors is manufactured with and checked for a tolerance as listed in the following table

Sensor types	Manufacturing tolerance
IBR/IBF-15	+ 0,05 mm
IBR/IBF-20/21	+ 0,05 mm
IBR/IBF-25/26	+ 0,05 mm
IBR/IBF-35/36	+ 0 mm - 0,1 mm
IBR/IBF-65/66/100	+ 0 mm - 0,1 mm

Against this background Intra-Automation guarantees an accuracy of + 0,3 % for ITABAR-flow-sensors.

MEN

Mess- und Eichwesen Niedersachsen
- Landesbetrieb -

Office of Legal Metrology of the state of Niedersachsen (Germany)



DIE BEI DEN MESSUNGEN VERWENDETEN NORMALE SIND AUF DIE NATIONALEN NORMALE
BEI DER PHYSIKALISCH-TECHNISCHEN BUNDESANSTALT RÜCKGEFÜHRT.
THE STANDARDS USED FOR THE MEASUREMENTS ARE TRACEABLE TO THE NATIONAL STANDARDS AT
THE PHYSIKALISCH-TECHNISCHE BUNDESANSTALT.

Prüfschein

Inspection certificate



Nummer

Number

20011647

Gegenstand

Object

Magnetisch – induktiver Durchflussmesser

Identifikation

Identification

Durchflusssaufnehmer

mit Seriennummer 8901N1738/A3

Messumformer MAG - XH

mit Seriennummer 8901N1738/B3

Hersteller

Manufacturer

Fischer & Porter GmbH

Antragsteller

Applicant

ABB Automation Products GmbH

Dransfelder Straße 2

37079 Göttingen

Anzahl der Seiten der Anlage

Number of pages of the addendum

eine

Ort und Datum der Prüfung

Place and date of inspection

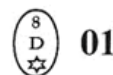
Göttingen, 20. September 2001

Gültigkeit der Prüfung bis 31. Dezember 2002

This inspection is valid until

Stempelzeichen

Marking



Prüfscheine ohne Unterschrift und Dienstsiegel haben keine Gültigkeit. Dieser Prüfschein darf nur unverändert weiterverbreitet werden.

Inspection certificates without signature and official stamp are not valid. This inspection certificate may only be reproduced in unchanged form.

Ort und Datum

Place and date



Im Auftrag

By order

Hannover, 24. September 2001

Wohlthat

Mess- und Eichwesen Niedersachsen, Goethestraße 44, 30169 Hannover

Telefon 0511 1266220

Telefax 0511 1266300



Zusätzliche Angaben zum Gegenstand

Additional comments concerning the object

Nennweite DN 500

Prüfverfahren

Test procedure

Die Messnormale wurden entsprechend der „Richtlinie für die Eichung von Volumenmessgeräten für strömendes Wasser und Anforderungen für die Normale“ vom 13. Juni 1996 geprüft.

Umgebungsbedingungen

Environmental conditions

Bei der Prüfung darf die Wassertemperatur 30 °C nicht überschreiten.

Ergebnis

Result

Durchfluss	Abweichung
m³/h	%
3000	-0,04
2250	-0,05
1500	-0,05
600	-0,35
1500	-0,09
1125	-0,21
800	0,32
300	-0,82

Der Zähler entspricht den „Anforderungen für Normale“ und kann als Referenzzähler verwendet werden.

Messunsicherheit

Uncertainty of measurement

Die Messunsicherheit wurde nicht bestimmt.

Hinweis

Notes

Die Prüfung verliert ihre Gültigkeit vorzeitig, wenn am Gegenstand Beschädigungen oder Veränderungen aufgetreten sind, die Einfluss auf dessen messtechnische Eigenschaften haben können oder wenn das aufgebrachte Stempelzeichen beschädigt oder entfernt wird.

Ende der Anlage

End of the addendum

A.7.1 Calibration Facility / Fa. ABB Göttingen (Germany)



A.7.2 Test Protocols

Calibration Facility: ABB Göttingen, PTB-tested / Test Stand PS 0014

Pipe ID : 306 mm / Medium : Water

Type Test	Operating temperature	Time sec	m ³ /h	Test m ³	Test Norm m ³	Error %
IBF-26	20°C	100	1000	27,632	27,594	0,1388
IBF-26	20°C	100	1000	27,616	27,615	0,0035
IBF-26	20°C	100	1000	27,662	27,652	0,0345
IBF-26	20°C	100	1000	27,563	27,555	0,0284
IBF-26	20°C	100	1000	27,598	27,608	0,0395
IBF-26	20°C	100	1000	27,599	27,547	0,1882
Average		100		27,612	27,595	0,0721

Type Test	Operating temperature	Time sec	m ³ /h	Test m ³	Test Norm m ³	Error %
IBF-36	20°C	100	1000	27,613	27,564	0,1807
IBF-36	20°C	100	1000	27,520	27,489	0,1125
IBF-36	20°C	100	1000	27,614	27,576	0,1400
IBF-36	20°C	100	1000	27,644	27,546	0,3531
IBF-36	20°C	100	1000	27,580	27,577	0,0130
IBF-36	20°C	100	1000	27,697	27,505	0,6983
Average		100		27,611	27,543	0,2496

Type Test	Operating temperature	Time sec	m ³ /h	Test m ³	Test Norm m ³	Error %
IBF-66	20°C	100	1000	27,499	27,432	0,2464
IBF-66	20°C	100	1000	27,451	27,425	0,0933
IBF-66	20°C	100	1000	27,436	27,457	-0,0774
IBF-66	20°C	100	1000	27,503	27,495	0,0274
IBF-66	20°C	100	1000	27,448	27,453	-0,0164
IBF-66	20°C	100	1000	27,618	27,569	0,1793
Average		100		27,493	27,472	0,0754

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Calibration Facility: ABB Göttingen, PTB-tested / Test Stand PS 0014
Pipe ID : 400 mm / Medium : Water

Type Test	Operating temperature	Time sec	m ³ /h	Test m ³	Test Norm m ³	Error %
IBF-26	9°C	100	2000	55,840	55,908	-0,1209
IBF-26	9°C	100	2000	55,635	55,788	-0,2743
IBF-26	9°C	100	2000	55,975	56,016	-0,0724
IBF-26	9°C	100	2000	55,909	56,001	-0,1648
IBF-26	9°C	100	2000	55,775	55,815	-0,0726
IBF-26	9°C	100	2000	55,673	55,779	-0,1914
Average		100		55,801	55,884	-0,1493

Type Test	Operating temperature	Time sec	m ³ /h	Test m ³	Test Norm m ³	Error %
IBF-36	3°C	100	2000	56,205	56,141	0,1135
IBF-36	3°C	100	2000	56,034	56,068	-0,0618
IBF-36	3°C	100	2000	56,050	56,028	0,0391
IBF-36	3°C	100	2000	56,197	56,260	-0,1111
IBF-36	3°C	100	2000	56,256	56,254	0,0039
IBF-36	3°C	100	2000	56,202	56,209	-0,0127
Average		100		56,157	56,160	-0,0048

Type Test	Operating temperature	Time sec	m ³ /h	Test m ³	Test Norm m ³	Error %
IBF-66	3°C	100	2000	55,622	55,641	-0,0337
IBF-66	3°C	100	2000	55,657	55,659	-0,0022
IBF-66	3°C	100	2000	55,713	55,644	0,1240
IBF-66	3°C	100	2000	55,505	55,583	-0,1405
IBF-66	3°C	100	2000	55,625	55,485	0,2523
IBF-66	3°C	100	2000	55,373	55,499	-0,2272
Average		100		55,583	55,585	-0,0045

Calibration Facility: ABB Göttingen, PTB-tested / Test Stand PS 0014
Pipe ID : 499 mm / Medium : Water

Type Test	Operating temperature	Time sec	m ³ /h	Test m ³	Test Norm m ³	Error %
IBF-26	8,2°C	100	3000	83,285	83,387	-0,1220
IBF-26	8,2°C	100	3000	83,443	83,831	-0,4628
IBF-26	8,2°C	100	3000	83,196	83,369	-0,2071
IBF-26	8,2°C	100	3000	83,323	83,543	-0,2684
IBF-26	8,2°C	100	3000	83,138	83,358	-0,2684
IBF-26	8,2°C	100	3000	83,012	83,358	-0,4155
Average		100		83,233	83,475	-0,2899

Type Test	Operating temperature	Time sec	m ³ /h	Test m ³	Test Norm m ³	Error %
IBF-36	8,2°C	100	3000	83,297	83,333	-0,0422
IBF-36	8,2°C	100	3000	83,170	83,130	0,0484
IBF-36	8,2°C	100	3000	83,723	83,097	-0,4502
IBF-36	8,2°C	100	3000	83,116	83,109	0,0079
IBF-36	8,2°C	100	3000	83,253	83,221	0,0375
IBF-36	8,2°C	100	3000	83,074	83,164	-0,1080
Average		100		83,105	83,176	-0,0844

Type Test	Operating temperature	Time sec	m ³ /h	Test m ³	Test Norm m ³	Error %
IBF-66	7,0°C	100	3000	83,512	83,602	-0,7078
IBF-66	7,0°C	100	3000	83,482	83,629	-0,1754
IBF-66	7,0°C	100	3000	83,802	83,830	-0,0330
IBF-66	7,0°C	100	3000	83,696	83,636	0,0715
IBF-66	7,0°C	100	3000	83,596	83,760	-0,1957
IBF-66	7,0°C	100	3000	83,683	83,701	-0,0219
Average		100		83,629	83,693	-0,0770

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Calibration Facility: ABB Göttingen, PTB-tested / Test Stand PS 0014
Pipe ID : 599 mm / Medium : Water

Type Test	Operating temperature	Time sec	m ³ /h	Test m ³	Test Norm m ³	Error %
IBF-26	6,0°C	100	4000	110,96	111,03	-0,0597
IBF-26	6,0°C	100	4000	110,93	111,10	-0,1550
IBF-26	6,0°C	100	4000	111,13	111,18	-0,0431
IBF-26	6,0°C	100	4000	110,86	111,08	-0,1973
IBF-26	6,0°C	100	4000	110,98	111,07	-0,0833
IBF-26	6,0°C	100	4000	111,09	111,12	-0,0208
Average		100		110,99	111,10	-0,0932

Type Test	Operating temperature	Time sec	m ³ /h	Test m ³	Test Norm m ³	Error %
IBF-36	2,4°C	100	4000	110,45	110,33	0,1116
IBF-36	2,4°C	100	4000	110,44	110,26	0,1615
IBF-36	2,4°C	100	4000	110,44	110,32	0,1081
IBF-36	2,4°C	100	4000	110,50	110,32	0,1640
IBF-36	2,4°C	100	4000	110,41	110,28	0,1215
IBF-36	2,4°C	100	4000	110,40	110,47	-0,0623
Average		100		110,44	110,33	0,1007

Type Test	Operating temperature	Time sec	m ³ /h	Test m ³	Test Norm m ³	Error %
IBF-66	5,0°C	100	4000	110,97	111,05	-0,0760
IBF-66	5,0°C	100	4000	110,68	110,90	-0,2060
IBF-66	5,0°C	100	4000	110,87	111,01	-0,1260
IBF-66	5,0°C	100	4000	110,65	111,05	-0,3622
IBF-66	5,0°C	100	4000	110,86	111,07	-0,1870
IBF-66	5,0°C	100	4000	111,13	111,09	0,0414
Average		100		110,86	111,03	-0,1526

Calibration Facility: ABB Göttingen, PTB-tested / Test Stand PS 0014
Pipe ID : 999 mm / Medium : Water

Type Test	Operating temperature	Time sec	m³ /h	Test m³	Test Norm m³	Error %
IBF-26	12,5°C	100	5000	139,99	140,14	-0,1067
IBF-26	12,5°C	100	5000	139,96	140,12	-0,1144
IBF-26	12,5°C	100	5000	139,82	139,92	-0,0685
IBF-26	12,5°C	100	5000	139,79	139,99	-0,1409
IBF-26	12,5°C	100	5000	139,51	139,78	-0,1954
IBF-26	12,5°C	100	5000	139,77	139,86	-0,0617
Average		100		139,81	139,97	-0,1146

Type Test	Operating temperature	Time sec	m³ /h	Test m³	Test Norm m³	Error %
IBF-36	16,5°C	100	5000	138,02	137,75	0,1985
IBF-36	16,5°C	100	5000	138,36	138,51	-0,1087
IBF-36	16,5°C	100	5000	138,72	139,09	-0,2662
IBF-36	16,5°C	100	5000	139,54	139,37	0,1195
IBF-36	16,5°C	100	5000	138,92	139,56	-0,4613
IBF-36	16,5°C	100	5000	139,66	139,68	-0,0181
Average		100		138,87	138,99	-0,0899

Type Test	Operating temperature	Time sec	m³ /h	Test m³	Test Norm m³	Error %
IBF-66	13,5°C	100	5000	138,32	138,70	-0,2685
IBF-66	13,5°C	100	5000	138,41	138,65	-0,1771
IBF-66	13,5°C	100	5000	139,11	138,69	0,3033
IBF-66	13,5°C	100	5000	138,86	138,63	0,1674
IBF-66	13,5°C	100	5000	139,10	138,60	0,3640
IBF-66	13,5°C	100	5000	138,50	138,78	-0,2013
Average		100		138,72	138,68	0,0313

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Calibration Facility: ABB Göttingen, PTB-tested / Test Stand PS 0014
Pipe ID : 1608 mm / Medium : Water

Type Test	Operating temperature	Time sec	m ³ /h	Test m ³	Test Norm m ³	Error %
IBF-26	12,5°C	100	5500	153,47	153,21	0,1698
IBF-26	12,5°C	100	5500	153,99	153,14	0,5586
IBF-26	12,5°C	100	5500	153,60	153,20	0,2594
IBF-26	12,5°C	100	5500	153,63	153,25	0,2465
IBF-26	12,5°C	100	5500	153,88	153,30	0,3813
IBF-26	12,5°C	100	5500	153,32	153,18	0,0879
Average		100		153,65	153,21	0,2839

Type Test	Operating temperature	Time sec	m ³ /h	Test m ³	Test Norm m ³	Error %
IBF-36	11,5°C	100	5500	154,61	154,45	0,1015
IBF-36	11,5°C	100	5500	153,68	154,28	-0,3892
IBF-36	11,5°C	100	5500	154,23	154,22	0,0042
IBF-36	11,5°C	100	5500	154,28	154,26	0,0130
IBF-36	11,5°C	100	5500	153,49	154,33	-0,5445
IBF-36	11,5°C	100	5500	154,16	154,69	-0,3376
Average		100		154,08	154,37	-0,1922

Type Test	Operating temperature	Time sec	m ³ /h	Test m ³	Test Norm m ³	Error %
IBF-66	11,5°C	100	5500	152,45	152,02	0,2856
IBF-66	11,5°C	100	5500	151,83	151,84	-0,0073
IBF-66	11,5°C	100	5500	152,35	151,95	0,2642
IBF-66	11,5°C	100	5500	152,13	151,94	0,1247
IBF-66	11,5°C	100	5500	152,36	152,03	0,2180
IBF-66	11,5°C	100	5500	152,49	151,86	0,4153
Average		100		152,27	151,94	0,2168

A.7.3 Documentation

a.) Available Certificates / Approvals:

The following tables shows the currently valid approvals and test certificates:

Sensor Type	Test Method	Result	Approval/Test Agency	Location	Date of Test
IBF-100	Sample design test to TA Luft 1986, 13. BlmSchV und 17. BlmSchV	Test passed	TÜV Rheinland Sicherheit und Umweltschutz GmbH	D-Köln	12.5.1999
IBF-20	Measurement accuracy	$\pm 0,5\%$ of rate for all measured values	NMI Nederlands Meetinstituut	NL-Dordrecht	24.3.2000
IBF-25	Measurement accuracy	$\pm 0,68\%$ of rate for all measured values	PIGSAR Ruhrgas AG (Staatl. anerkannt)	D-Dorsten	24.11.1999
IBF-25/26	Sample design test to TA Luft 1986, 13. BlmSchV und 17. BlmSchV	Test passed	TÜV Rheinland Sicherheit und Umweltschutz GmbH	D-Köln	12.5.1999
IBF-35/36	Sample design test to TA Luft 1986, 13. BlmSchV und 17. BlmSchV	Test passed	TÜV Rheinland Sicherheit und Umweltschutz GmbH	D-Köln	12.5.1999
IBFD-26-HTG	Test according to TRD 110 and TRD 110 Anlage 1	Test passed	VdTÜV	D-Essen	7.12.1995
IBR-25/26	Sample design test to TA Luft 1986, 13. BlmSchV und 17. BlmSchV	Test passed	TÜV Rheinland Sicherheit und Umweltschutz GmbH	D-Köln	12.5.1999
IBR-35/36	Sample design test to TA Luft 1986, 13. BlmSchV und 17. BlmSchV	Test passed	TÜV Rheinland Sicherheit und Umweltschutz GmbH	D-Köln	12.5.1999

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b.) Ordering Codes for Documentation

General Documentation	
Code	Description
D001	Certificate of Conformance
D002	Certificate of Origin (issued by Intra)
D003	Certificate of Origin by German Chamber of Commerce
D003.1	Legalized by Embassy of Recipient
D004	QA-Manual
D005	Documents on CD

Order-related Documentation	
Code	Description
D007	Manufacturer's Record Book Index (MRB)
D008	Special product drawing
D009	Standard QA-plan
D010	Inspection Certificate
D011	Calibration Certificate (Calibration with water, 3-point)
D012	Manufacturing Schedule
D013	Manufacturing Progress Status Report
D014	Inspection and Test Plan
D015	Test Procedures (Covering Manufacturing)
D016	Welding Procedures (WPS, PQR), Standard Material
D017	Welding Procedures (WPS, PQR), Special Material
D018	Paint & Coating Procedure
D019	Preservation, Preparation for Shipment Procedures
D020	Spare Parts List
D021	Special Tools List

Material Certificates	
Code	Description
D022	Material Certificate (EN10204 2.2)
D023	Material Certificate (EN10204 3.1) for series IBF and IBR
D024	Material Certificate (EN10204 3.1) for all other series
D025	Material Certificate (EN10204 3.2)
D026	Material Certificate (EN10204 3.3)

Inspection & Testing	
Code	Description
D027	Hydraulic Pressure Test incl. Test Certificate
D028	Construction- and Pressure Test acc. to Pressure Vessel Guidelines by TÜV, incl. Material Certificate (EN10204 3.1)
D029	Construction- and Pressure Test acc. to AD-procedure, TRB and TRC by TÜV, incl. Material Certificate (EN10204 3.1)
D030	X-Ray-Testing for Welding Seams as per DIN 54111 or ASME Sec. VIII
D031	Dye Penetrant Testing for Welding Seams as per DIN 54152 or ASME Sec. VIII
D032	Hardness Test acc. to NACE MR01-75, incl. NACE-Conformity Certificate (only with material certificate EN 10204 3.1)
D033	Weight Certificate
D034	Error Check (PMI-Check)
D035	Certificate about Ferrite Particles in Welding Seam

A.8 Accessories for Itabar-Flow-Sensors

A.8.1 Shut-off devices for the pressure pipes



Fig. 20: Ball Valve
PN 40 (580 psi); 1.4401 (316SS)
(A56)



Fig. 21: Needle valve 1/2" NPT,
PN400 (5801 psi; 1.4401 (316SS)
(A62)



Fig. 22: 3-way-manifold
PN 400 (5801 psi); 1.4401 (316SS)
(A66)

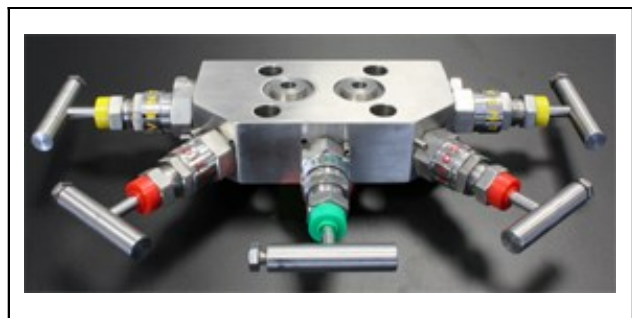


Fig.: 23: 5-way-manifold
1.4401 (316SS)
(A71)



Fig. 24: Shut-Off-Valve
PTFE
(A63)

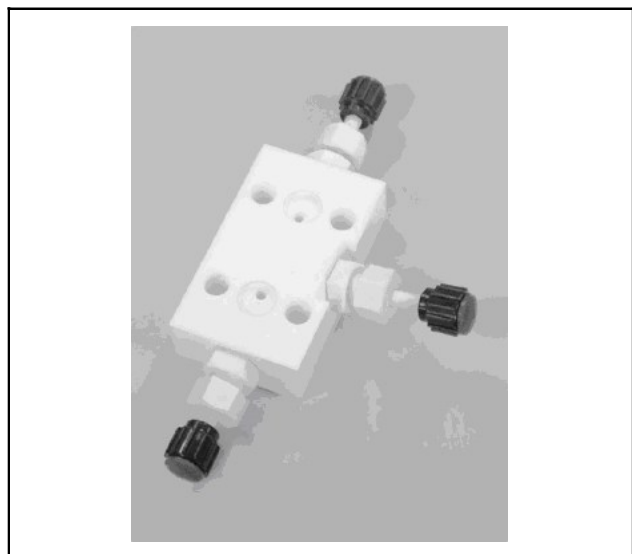


Fig. 25: 3-way-manifold
PTFE
(A67)

A.8.2 Signal Transmitters

a.) Δp Transmitter INTP340

In general, Itabar®-Flow-Sensors can be operated with each Δp -transmitter in the market. Intra-Automation recommends its standard transmitter INTP340

Application:

Various versions for the transmitter INTP, are available with a two-wire circuit. The output signal is a load-independent direct current of 4 to 20 mA linearly proportional to the input pressure.

Transmitters conforming to the type of protection “intrinsic safety” and “explosion proof” may be installed with potentially explosive atmospheres (Zone1) or Zone0. The transmitters are provided with an EU prototype test certificate and comply with the corresponding harmonized European standards of the CENELEC.

Transmitters with the type of protection “intrinsic safety” for use in Zone0 may be operated with power supply units of category “ia” and “ib”.

The transmitters can be equipped with various designs of remote seals for special applications such as the measurement of highly viscous substances.

The transmitter can be programmed locally by using three input keys or externally via HART. The following table describes the fundamental parameters. Further parameters for special applications are accessible via HART.

Elements for parametrizing the transmitter:



Fig. 26: Δp -Transmitter INTP340

Parametrization using	Input keys	HART-communication
Application, measurement type	☒	☒
Lower range value / upper range value	☒	☒
Electric damping	☒	☒
Zero adjustment	☒	☒
Fault current	☒	☒
Saturation limits	☒	☒
Scaling on the display	☒	☒
Characteristic selection	☒	☒
Temperature unit	☒	☒
Key lock	☒	☒
Change user pin	☒	☒
Functional safety	☒	☒
Loop test	☒	☒
Start view	☒	☒
Pressure reference	☒	☒
Reset	☒	☒
Diagnostics and trend log		
Min/Max pointer	☒	☒
Limit monitoring	2	2
Event counter (overflow/underflow)	2	2
Trend log		2, max 1500 values
Diagnostic log	☒	☒
Parameters change log		☒

Transmitter for differential pressure and flow:

This type of transmitter is used to measure

- The differential pressure
- A small positive or negative pressure
- The flow $q \sim \sqrt{dp}$ (together with a primary differential pressure device)

Spans are possible from 1 mbar to 30 bar.

Pressure limit of medium for differential pressure and flow transmitters		
Span	Upper pressure limit of medium	Max test pressure
1,0...20 mbar	160 bar	240 bar
1,0...60 mbar	160 bar	240 bar
2,5...250 mbar	160 bar	240 bar
6,0...600 mbar	160 bar	240 bar
16...1600 mbar	160 bar	240 bar
50...5000 mbar	160 bar	240 bar
0,3...30 bar	160 bar	240 bar

Technical Data:

Input:

Measured variable : Differential pressure and flow

Measuring range:

Span (continuously adjustable)

- nominal pressure PN32 : 1 mbar to 20 mbar
 - nominal pressure PN160 : 1 mbar to 30 bar
 - nominal pressure PN420 : 2,5 mbar to 30 bar

Lower measuring limit:

- measuring cell with silicone oil filling : -100 % of max. span or 30 mbar (abs.)

Accuracy:

Reference conditions :

- According to EN 60770-1
- Rising characteristics curve
- Lower range value 0 bar
- Measuring cell with silicone oil filling
- Room temperature (25°C)

Error in measurement with fixed point-setting (incl. hysteresis and repeatability)

- linear characteristics:

$r \leq 5$
 $5 \leq r \leq 20$
 $5 \leq r \leq 60$: $\leq (0,005 \times r + 0,05) \%$

- square root characteristics:

Flow > 50 % : $\leq 0,1 \%$ @ $r \leq 10$
 $\leq 0,2 \%$ @ $10 \leq r \leq 30$
 Flow 25 to 50 % : $\leq 0,2 \%$ @ $r \leq 10$
 $\leq 0,4 \%$ @ $10 \leq r \leq 30$

Repeatability : Incl. in error in measurement
 Hysteresis : Incl. in error in measurement
 Response time : 20 mbar/0,160 s // 60 mbar/0,150 s // 250 mbar + higher/
 (T₆₃, without electric damping) 0,135 s (approx.)
 Long term-stability at ±30°C : In 5 years: $\leq (0,25 \times r) \%$, in 10 years: $\leq (0,35 \times r) \%$,

Process temperature:

- silicone oil filling : -40...+100°C
 30 bar measuring cell : -40...+85°C
 - inert filling liquid: : -20...+100°C
 30 bar measuring cell : -20...+85°C

Process temperature limit: : see process temperature

Process pressure limits : Nominal pressure (PN)

Itabar-Flow-Sensors

Ordering Information:

Code	Description									
INTP340	Transmitter for Differential Pressure, HART-communication, 4...20 mA									
	Measurement cell filling fluid									
	-1	Silicone oil								
	-2	Inert fluid								
	-3	Neobee Oil								
	Measuring span (min/max)									
	-B	1,0...20 mbar								
	-D	1,0...60 mbar								
	-G	2,5...250 mbar								
	-H	6,0...600 mbar								
	-M	16,0...1600 mbar								
	-P	50,0 ...5000 mbar								
	-R	300,0...30.000 mbar								
	Process connection									
	-L	Oval flange, mtg thread 7/16"-20 UNF (IEC 61518)								
	-M	Oval flange, mtg thread M10 (PN160),M12 PN420)(DIN 19213) with side venting								
	-N	Oval flange, mtg thread 7/16"-20 UNF (IEC 61518) with side venting								
	-P	Oval flange, mtg thread M10 (PN160),M12 PN420)(DIN 19213) with side venting								
	-V	Design for diaphragm seal Pressure, mounting thread 7/16"-20 UNF (IEC 61518)								
	-W	Design for diaphragm seal Pressure, mounting thread M10 (DIN 19213)								
	Material of wetted parts									
		Diaphragm				Process connection				
	-0	St.St. 316L/1.4404				St.St. 316L/1.4404				
	-1	Hastelloy C276/2.4819				St.St. 316L/1.4404				
	-2	Hastelloy C276/2.4819				Hastelloy C276/2.4819				
	-4	Tantal				Tantal				
	-5	Monel 400(2.4360)				Monel 400(2.4360)				
	-6	St.St. 316L/1.4404				gold-plated				
	-8	St.St. 316L/1.4404				St.St. 316L/1.4404				
	Material of non-wetted parts									
	-1	Die-cast aluminium								
	-2	St.St. Precision casting								
	Housing									
	-5	Dual chamber device								
	Ignition protection type:									
	-A	without Ex								
	-B	Intrinsic safety								
	Electrical connections									
	-F	2 x M20 x 1,5								
	-M	2 x 1/2"-14 NPT								
	Local operation / Display									
	-0	without display (lid closed)								
	-1	with display (lid closed)								
	-2	with display (cover with glass pane)								
INTP340						-5				-Z (Options, see next page)

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-Z	Transmitter for Differential Pressure, HART-communication, 4...20 mA / Options
A00	Cable gland enclosed, plastic
A01	Cable gland enclosed, metal
A02	Cable gland enclosed, stainless steel
A03	Cable gland enclosed, stainless steel 316L/1.4404
B11	Nameplate labelling GERMAN - bar
B12	Nameplate labelling FRENCH - bar
B13	Nameplate labelling SPANISH - bar
B20	Nameplate labelling ENGLISH – psi
C11	Quality test certificate - 5-point factory calibration (IEC 60770-2)
C12	Inspection certificate (EN10204-3.1) - Material of pressurised and wetted parts
C13	Works certificate - NACE (MR 0103-2016 and MR 0175-2015)
C14	Works certificate - (EN10204-2.2) - wetted parts
C15	Inspection certificate (EN10204-3.1) - PMI-test of pressurised and wetted parts
D21	Housing gasket FVMQ
D30	Protection class IP66/IP68 (not for M12 and Han plugs)
D40	TAG plate unlabelled
D41	Without labelling of the measuring range on the TAG label
D60	Transmitter wrapped in foil
D61	Clnng the meas. cell grease-free in acc. with cleanliness level 2, DIN 25410; transm. wrapped in film
D62	Clnng of the meas. cell grease-free (for oxygen version) and transm. wrapped in foil; particles < 50 mg/m ²
D90	Adhesive labels on transport packaging (provided by customer)
E00	General approval without Ex approval: Worldwide (CE, RCM)
E20	ATEX (Europe)
E80	Oxygen version (inert liquid max. 100 bar (1450 psi) at 60°C (140°F)); meas. cell cleaning grease-free according to cleanliness level 2, DIN 25410, transmitter packed in foil
H01	Mounting bracket, galvanised steel
H02	Mounting bracket, stainless steel 1.4301/304
H03	Mounting bracket, stainless steel 1.4404/316L
J70	DP with flange EN 1092-1 form B1 DN25 PN40, stainless steel 1.4571/316Ti
J71	DP with flange EN 1092-1 form B1 DN50 PN40, stainless steel 1.4571/316Ti
J72	DP with flange EN 1092-1 form B1 DN80 PN40, stainless steel 1.4571/316Ti
J73	DP with flange EN 1092-1 form C DN25 PN40, stainless steel 1.4571/316Ti
J74	DP with flange EN 1092-1 form C DN50 PN40, stainless steel 1.4571/316Ti
J75	DP with flange EN 1092-1 form C DN80 PN40, stainless steel 1.4571/316Ti
J76	DP with flange connection and temperature extension
J77	DP/P flange connection with epoxy resin coating
J78	DP with flange EN 1092-1 form B1 DN15 PN40, stainless steel 1.4571/316Ti
K84	Valve 1/4"-18 NPT, material same as pressure caps
K85	Valve side-mounted, measuring medium: gas
K86	Oval flange enclosed, PTFE gasket + fixing screws
Y01	Meas. range setting: Lower range value(max. 5 digits); Upper range value(max. 5 digits); Unit (mbar. bar. kPa. MPa. psi.)
Y02	Characteristic curve square root extraction (VSLN2. MSLN2). Example: VSLN2
Y15	System label (TAG) (stainless steel plate. device parameters. max. 32 digits)
Y16	Measuring point description (stainless steel plate. Device parameters. max. 32 digits)
Y17	System identification (TAG) short (device parameter, max. 8 digits)
Y21	Display: (pressure. per cent). Pressure reference (none. absolute. relative). Example: Pressure relative
Y22	Display: Scaling with standard units (m3/s. l/s. m. inch....) Example: 1 & 5 m3/s
Y23	Display: Scaling with user-specific units (max. 8 digits). Example: 1 & 5 bb/day
Y26	Fieldbus compatibility. Example: HART 5
Y30	Saturation limits instead of 3.8...20.5 mA. Example: 3.8...22.0 mA
Y31	Fault current instead of 3.55 mA (22.5 mA. 22.8 mA) Example: 22.5 mA
Y32	Damping instead of 2 s (0.0 & 100.0 s). Example: 4 s
Y99	ID number of special version

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b.) Multivariable Transmitter Type: 267 CS

Signal transmitters for mass-flow-measurement – also known as multivariable Δp transmitters – serve to measure the density-compensated flow of gases, steam and liquids. Such transmitters (Fig. 27) allow a compact modular construction with pitot tubes as the flow sensing instrument (Fig. 28).

In conditions of changing operating temperatures and pressures the resulting operation density of a process fluid can vary over a wide range. As an example: a pressure- and temperature-change of only 2 % can result in a 1% change of the mass flow value.

While a direct measurement of a fluid's density is possible in principle, it is often too cumbersome to accomplish.

In most cases it is easier to measure the operating temperature and pressure and include these values in mass flow calculations. With information about volumetric flow, operating temperature and operating pressure mass flow can be calculated as follows:

- Information about the volumetric flow value is derived from a pressure difference generated at the pitot tube flow sensor. This differential pressure (Δp) is measured with a differential pressure sensor, which is a built-in component of the transmitter.
- Information about the fluid operating pressure is measured by a separate absolute pressure sensor inside the same transmitter. There is an electrical connection between the Δp and absolute pressure sensor inside the transmitter. No wiring is required.
- The fluid operating temperature can be measured by means of either a RTD built into the flow sensor or a temperature sensor mounted separately. In both cases connection wiring has to be done.

Mass flow is calculated from volumetric flow and fluid density. The aggregate condition if a fluid is important:

- To calculate the densities of liquids a polynomial is used with operating temperature as its process variable.
- For calculation of steam density an equation with operating temperature as its process variable is applied.
- To calculate the density of gases gas laws are applied, taking into consideration both operating temperature as well as operating pressure.



Fig. 27 Transmitter for volumetric flow, fluid temperature and pressure measurement as well as calculation of mass flow value



Fig 28 Compact sensor with multivariable transmitter

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For a number of commonly measured fluids the functional relationships between density and operation temperature as well as operating pressure are stored in the transmitter's memory. Mass flow of other fluids can be measured by programming the appropriate density-temperature-pressure relations into the transmitter.

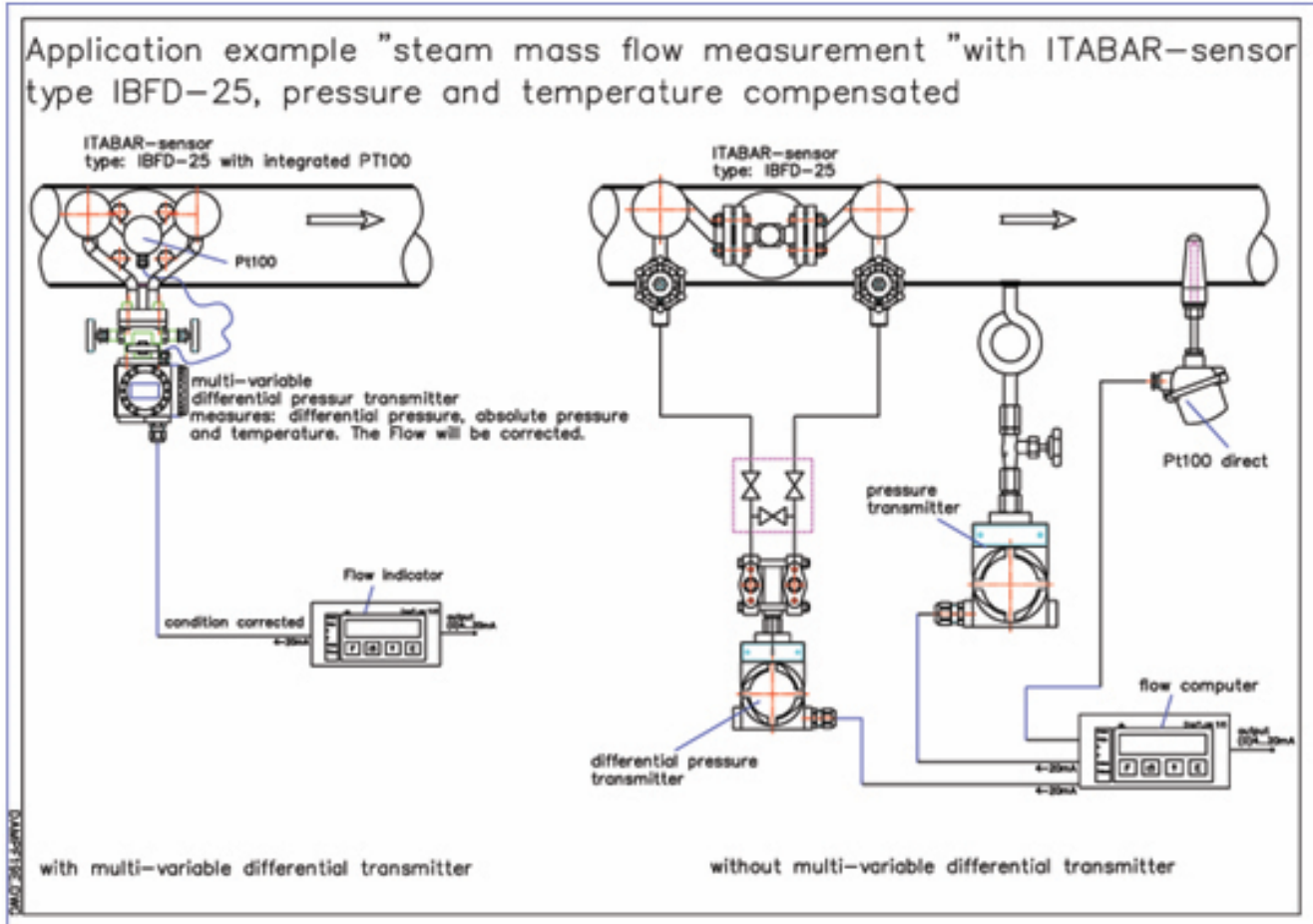


Fig 29: Mass flow instrumentation of conventional transmitters vs. multivariable transmitters

Fig 29 illustrated two possible instrumentation arrangements for steam mass flow measurement. The advantages of the multivariable transmitter arrangement are:

- simple and cost-saving installation
- pipe line only has to be tapped at one place
- quick installation and removal from the process
- no need to cut the pipe
- replacement of RTD is possible under pressure
- no additional installation and wiring procedures for pressure and temperature sensors
- no need for additional corrective temperature/pressure calculators

Itabar-Flow-Sensors

Ordering Information:

Code	Description					
267CS	Multivariable Transmitter for Mass Flow / Base Accuracy: 0,075 %					
	Sensor Span Limits					
	A	0,05...1 kPa	0,5...10 mbar	0,2...4" H2O		
	C	0,2...6 kPa	0,8...24 mbar	0,8...24" H2O		
	F	0,4...40 kPa	4...400 mbar	1,6...160" H2O		
	L	2,5...250 kPa	25...2500 mbar	10...1000" H2O		
	N	20...2000 kPa	0,2...20 bar	209...290 psi		
	Static Pressure Range					
	1	0...0,6 MPa	0...6 bar	0...87 psi	1	
	2	0...2 MPa	0...20 bar	0...290 psi	2	
	3	0...10 MPa	0...100 bar	0...1450 psi	2	
	4	0...41 MPa	0...410 bar	0...5945 psi	2	
	Diaphragm Material / Fill Fluid (wetted parts)					
	S	AISI 316L	Silicone oil	NACE		
	K	Hastelloy C276	Silicone oil	NACE		
	M	Monel 400	Silicone oil	NACE		
	V	Monel 400, gold plated	Silicone oil	NACE		
	T	Tantalum	Silicone oil	NACE		
	A	AISI 316L ss	Inert fluid	NACE	3	
	F	Hastelloy C276	Inert fluid	NACE	3	
	C	Monel 400	Inert fluid	NACE	3	
	Y	Monel 400, gold plated	Inert fluid	NACE	3	
	D	Tantalum	Inert fluid	NACE	3	
	Process Flanges/Adapters Material and Connection (wetted parts) / horizontal					
	A	AISI 316L	1/4-18" NPT-F direct (7/16" UNF U.S. drilling)	NACE		
	C	AISI 316L	1/4-18" NPT-F direct (DIN 19213)	NACE		
	B	AISI 316L	1/2-14" NPT-F through adapter (7/16" UNF U.S. drilling)	NACE		
	D	Hastelloy C276	1/4-18" NPT-F direct (7/16" UNF U.S. drilling)	NACE		
	E	Hastelloy C276	1/2-14" NPT-F through adapter	NACE		
	F	Hastelloy C276	1/4-18" NPT-F direct (DIN 19213)	NACE		
	G	Monel 400	1/4-18" NPT-F direct (7/16" UNF U.S. drilling)	NACE		
	L	Monel 400	1/4-18" NPT-F direct (DIN 19213)	NACE		
	H	Monel 400	1/2-14" NPT-F through adapter (7/16" UNF U.S. drilling)	NACE		
	P	Kynar (PVDF)	1/4-18" NPT-F direct (7/16" UNF U.S. drilling)	NACE		
	Bolts/Gaskets (wetted parts)					
	3	Stainless steel	NACE	Viton	NACE	3
	4	Stainless steel	NACE	PTFE	NACE	
	5	Stainless steel	NACE	EPDM	NACE	
	6	Stainless steel		Perbunan		
	Housing material and electrical connection					
	A	Alum.	(barrel ver.)	1/2"-14 NPT		
	B	Alum.	(barrel ver.)	M20x1.5	NV; FM; CSA	
	E	Alum.	(barrel ver.)	Harting HAN-connector	NV; ATEX EExd, FM; CSA 4)	
	G	Alum.	(barrel ver.)	Fieldbus-connector	NV; ATEX EExd, FM; CSA 4)	
	S	SS	(barrel ver.)	1/2"-14 NPT		
	T	SS	(barrel ver.)	M20x1.5	NV; FM; CSA	
	J	Alum.	(DIN-type)	M20x1.5	NV; FM; CSA	
	K	Alum.	(DIN-type)	Harting HAN-connector	NV; ATEX EExd, FM; CSA 4)	
	W	Alum.	(DIN-type)	Fieldbus-connector	NV; ATEX EExd, FM; CSA 4)	
	Output / Additional options (to be ordered by "Additional Ordering Code")					
	H	4...20 mA HART	no additional options		5, 6	
	1	4...20 mA HART	options requested		5	
	P	PROFIBUS PA	no additional options		5, 6	
	2	PROFIBUS PA	options requested		5	
	F	Foundation-Fieldbus	no additional options		5, 6	
	3	Foundation-Fieldbus	options requested		5	
	M	Modbus RS485	no additional options		5, 6	
	5	Modbus RS485	options requested		5, 6	
	N	Modbus RS232	no additional options		5, 6	
	6	Modbus RS232	options requested		5, 6	
267CS						

Additional Ordering Code 267CS:

Drain / Vent (material and position) (wetted parts)				
V1	AISI 316L	on process axis	NACE	7)
V2	AISI 316L	on flange side top	NACE	7)
V3	AISI 316L	on flange side bottom	NACE	7)
V4	Hastelloy C276	on process axis	NACE	8)
V5	Hastelloy C276	on flange side top	NACE	8)
V6	Hastelloy C276	on flange side bottom	NACE	8)
V7	Monel 400	on process axis	NACE	9)
V8	Monel 400	on flange side top	NACE	9)
V9	Monel 400	on flange side bottom	NACE	9)
Electrical Certification				
E1	ATEX Group II Category 1/2 GD – intrinsic safety EEx ia			
E2	ATEX Group II Category 1/2 G – flameproof EEx d			
E3	ATEX Group II Category 3 GD – type of protection N EEx nL, design compliance			
EA	Factory Mutual (FM) – Intrinsically Safe			
EB	Factory Mutual (FM) – Explosion Proof (only with ½” NPT electr. conn. and SS label)			
ED	Canadian Standard Association – Intrinsically Safe			
EE	Canadian Standard Association – Explosion Proof			
Integral LCD				
L1	Digital LCD integral display			
L2	Backlit digital LCD integral display			
Mounting Brackets (shape and material)				
B2	for pipe mounting AISI 316L (1.4404)			
B4	for wall mounting AISI 316L (1.4404)			
Labels & TAG Language				
T1	German / SS (not available with DIN Electronic housing code J, K, W)			
TA	German and English / Plastics (not suitable for Factory Mutual – Explosion Proof)			
Additional TAG-plate				
I1	SS			
Preparation Procedure				
P1	Oxygen Service Cleaning (only with Inert fill; P _{max} =12MPa/120bar/1740psi; T _{max} =60°C/140°F)			
P2	Hydrogen Service Preparation			
Certificates				
C1	Inspection certificate EN10204-3.1B of calibration			
C3	Inspection certificate EN10204-3.1B of the cleanliness stage acc. DIN 25 410			
C4	Inspection certificate EN10204-3.1B of helium leakage test of the sensor module			
C5	Inspection certificate EN10204-3.1B of the pressure test			
C6	Certificate of Compliance 2.1 of the housing design EN 10204			
Material traceability				
H1	Certificate of Compliance with the order EN 10204-2.1 of the instrument design			
H3	Inspection certificate EN10204-3.1B of pressure retaining and process wetted parts			
H4	Test report EN 10204-2.2 of the pressure bearing and process wetted parts			
Connector				
U1	Fieldbus 7/8 (only for FOUNDATION Fieldbus, without adapter)			6, 10)
U2	Fieldbus M12x1 (only for PROFIBUS PA, without adapter)			6, 10)
U3	Harting HAN 8U, straight entry			5, 11)
U4	Harting HAN 8U, angle entry			5, 11)

Footnotes:

- 1) not available with sensor code C, F, L, N
- 2) not available with sensor code A
- 3) suitable for oxygen service
- 4) select type in "Additional Order Codes"
- 5) not available with Electronic Housing code G and W
- 6) not available with Electronic Housing code E and K
- 7) not available with Process Flanges/Adapters – Code D, E, F, H, L, P
- 8) not available with Process Flanges/Adapters – Code A, B, C, G, H, L, P
- 9) not available with Process Flanges/Adapters – Code A, B, C, D, E, F, P
- 10) not available with Electronic Housing code T, S, A, B, J
- 11) not available with Electronic Housing code T, S, A, B, J, K

A.8.3 Resistance Thermometer (RTD) / R/I-Transmitter

a) Resistance Thermometer (RTD) – PT-100

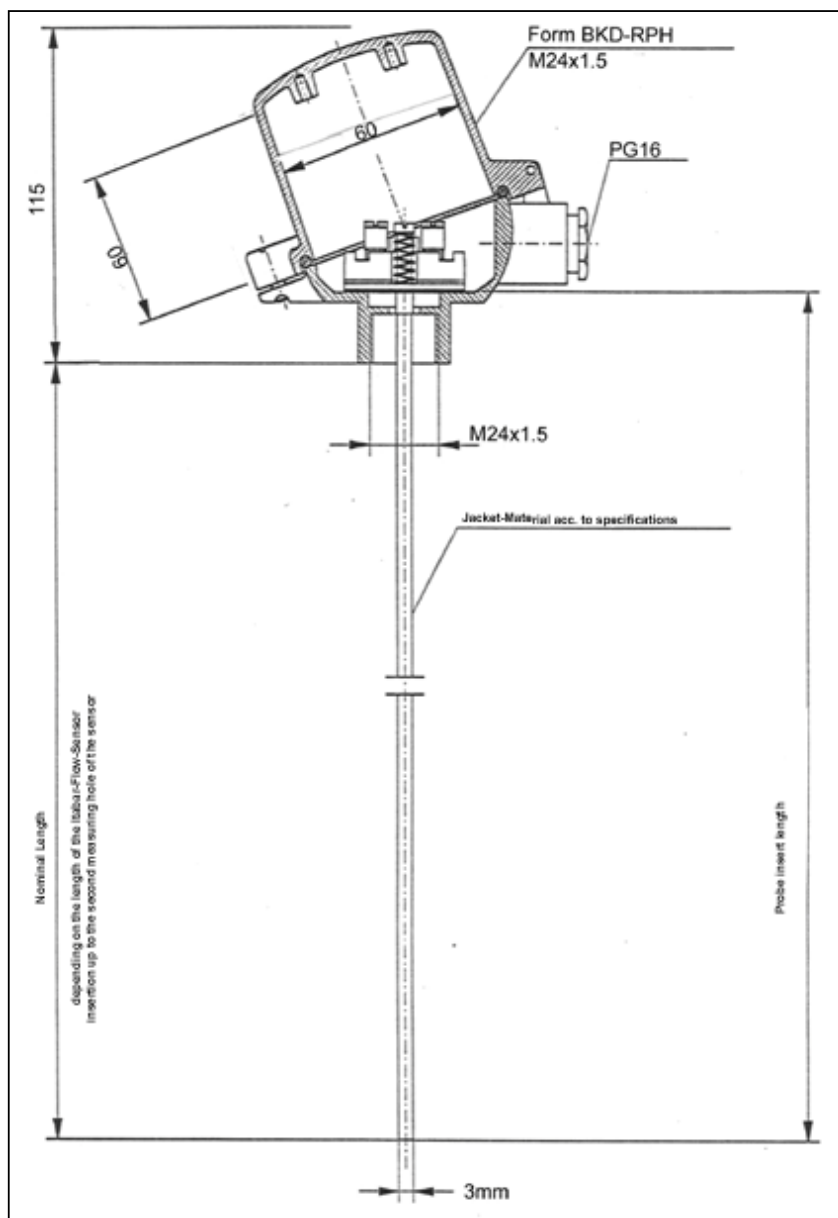


Fig 30: RTD – 100 Ω Platinum

Technical Data:

Temperature Limits °C [°F]	
Sensors 1/16 to 1/8"	EExi, EExd 1/16 to 1/8" (explosion proof)
-200...+550 [-328...+1022]	-200...+500 [-328...+932]

Accuracy

class A	$\pm(0,15+0,002 \text{ Itl})$
class B	$\pm(0,3+0,002 \text{ Itl})$
class 1/2 DIN	$\pm(0,15+0,002 \text{ Itl})$
class 1/3 DIN	$\pm(0,1+0,002 \text{ Itl})$

Measuring sensor coating

The sensors (resistance thermometer and thermocouples) are coated with a compressed MgO- powder and are protected by metal jackets (protective tube). The jacket is non porous and can be bent up to a defined radius.

Important: only bend the jacket at 2" off the tip of the sensor.

Terminal

The terminal, material ceramic, is fixed with two M4- spring screws (up to 0.4" play) onto the connection head. The screws diameter and distance are according to the head types A and B.

Typical resistance values for the sensor +16 °C [+60 °F] up to 35 °C [+95 °F] (for length of cable)

Diameter 1/8": ~ 0,28 Ω/m [0,085 Ω/ft]

Insulation resistance at +16 °C [+60 °F] up to 35 °C [+95 °F] (acc. IEC 751)

≥100 MΩ with U ≤100 VDC

Sensitive length of the sensor

For resistance thermometers: max. 1 ½" for all sensor diameters.

Response time without protective tube

The values are for the sensors without protective tube. The response time is the time delay, with which the sensor output corresponds to a change in temperature.

t 0,5 necessary time until the temperature change indication reaches 50% of its total value.

t 0,9 necessary time until the temperature change indication reaches 90% of its total value.

	Water		Air	
Sensor	~ 0,65 ft/s		~ 3,3 ft/s	
	t 0,5	t 0,9	t 0,5	t 0,9
WT 1/8" ⚡	1,6 s	5,5 s	25 s	86 s

Response time for sensors integrated into Itabar®-Flow-Sensors

The values are for sensor integrated into ITABAR® flow sensors. The response time is the time delay, with which the sensor output corresponds to a change in temperature.

t 0,5 necessary time until the temperature change indication reaches 50% of its total value.

t 0,9 necessary time until the temperature change indication reaches 90% of its total value.

	Water		Air	
Sensor	~ 0,65 ft/s		~ 3,3 ft/s	
	t 0,5	t 0,9	t 0,5	t 0,9
WT 1/8" ⚡	2,4 s	8,3 s	37,5 s	129 s

Immersion depth

To avoid measurement errors due to heat conduction and heat radiation, the following depth of immersion are recommended:

Sensor	Liquids	Gas / steam
WT 1/8"	45 mm [1.78"]	55 mm [2.15"]

Vibration resistance

The vibration resistance of these sensors is at least equal to the values described in IEC 751, article 4.42 (30 m/s²), 10-500Hz, at 'harsh conditions' during 150 hours in 2 axis.

Itabar-Flow-Sensors

Sensor for potentially explosive atmosphere

The sensors can be mounted in Zone 1 (class 1 div. 1) or Zone 2 (class 1 div. 2), not in Zone 0. All sensors delivered for usage in this atmosphere are equipped with an identification plate. Please always refer to the technical data if spare parts need to be ordered.

Protection type ,explosion proof housing' for EExd-version:

The sensor itself cannot comply with this requirement. The system has to be equipped with an explosion proof EExd- connection head with type approved screw gland for the cable and a neck tube with flame blocker according to EN 50018.

Protection type ,intrinsically safe' for EExi-version:

The sensor is equipped with one or two measuring circuits. These are tested for intrinsic dielectric strength, by applying 500 V AC to the circuits and ground and between the circuits. The identification plate of the sensor displays information for the operation of the sensor within intrinsically safe measurement circuits. The installed devices on the output side are type approved accordingly; power and heat loss are according to EN 50020. The connection head is delivered including a terminal for grounding.

Advantages of RTD

- Excellent long-term stability
- Output signal is temperature-linear
- Good corrosion resistance
- High accuracy

b.) R/I Transmitters for RTD-Signals

The resistance thermometer (RTD) puts out a $\square$ -signal. For further interpretation this signal has to be converted into a current signal. Depending on the transmitter this can be a 4...20 mA signal, a HART protocol-signal, a PROFIBUS-PA-signal or a Fieldbus Foundation-signal.

Intra-Automation GmbH has a head-transmitter for each of these applications. To choose the right transmitter for your application, the following information is needed:

Code	Transmitter	Ex-approval	Connection head
0	w/o	---	Form B
1	4...20 mA	w/o	Form BUZH
2	4...20 mA/HART	w/o	Form BUZH
3	Profibus PA	w/o	Form BUZH
4	Foundation Fieldbus	w/o	Special
5	4...20 mA	ATEX EEx ia	Form BUZH
6	4...20 mA/HART	ATEX EEx ia	Form BUZH
7	Profibus PA	ATEX EEx ia	Form BUZH
8	Foundation Fieldbus	ATEX EEx ia	Special
Y	others, please specify		

For the different applications, Intra-Automation has the following transmitters taken into it's program:

- INT5333A: 4...20 mA, non-Ex
- INT5333D: 4...20 mA, ATEX EExia
- INT5335A: SMART/HART; non-Ex
- INT5335D: SMART/HART; ATEX EExia
- TMT162: Foundation Fieldbus; no-Ex or ATEX EExia

INT5333

R/I Head Transmitter (4...20 mA)

INT5333
2-wire
programmable
Transmitter



2-WIRE PROGRAMMABLE TRANSMITTER
INT5333

- RTD or Ohm input
- High measurement accuracy
- 3-wire connection
- Programmable sensor error value
- for DIN form B sensor head mounting

Application:

- Linearized temperature measurement with Pt100...Pt1000 or Ni100...Ni1000 sensor
- Conversion of linear resistance variation to a standard analogue current signal, for instance from valves or Ohmic level sensors

Technical characteristics:

- Within a few seconds the user can program INT5333 to measure temperatures within all RTD ranges defined by the norms.
- The RTD and resistance inputs have cable compensation for 2- and 3-wire connection.

Mounting / installation:

- For DIN form B sensor head or DIN rail mounting with a special fitting.

Order information:

Type	Version	
INT5333	Standard	: A
	EEx	: D

INT-5335

R/I Head Transmitter (SMART/HART)

INT5335
2-wire
programmable
Transmitter
with HART-Protocol



- **RTD, TC, Ohm, or mV input**
- **Extremely high measurement accuracy**
- **HART-Communication**
- **Galvanic isolation**
- **for DIN form B sensor head mounting**

Application:

- Linearized temperature measurement with Pt100...Pt1000 or Ni100...Ni1000 or TC sensor.
- Difference or average temperature measurement of 2 RTD or TC sensors.
- Conversion of linear resistance variation to a standard analogue current signal, for instance from valves or Ohmic level sensors.
- Amplification of a bipolar mV signal to a standard 4...20 mA current signal.
- Connection of up to 15 transmitters to a digital 2-wire signal with HART communication.

Technical characteristics:

- Within a few seconds the user can program INT5335 to measure temperatures within all RTD ranges defined by the norms.
- The RTD and resistance inputs have cable compensation for 2-, 3- and 4-wire connection.
- Continuous check of vital stored data for safety reasons.
- Sensor error detection according to the guidelines in NAMUR NE 89.

Mounting / installation:

- For DIN form B sensor head or DIN rail mounting with a special fitting.

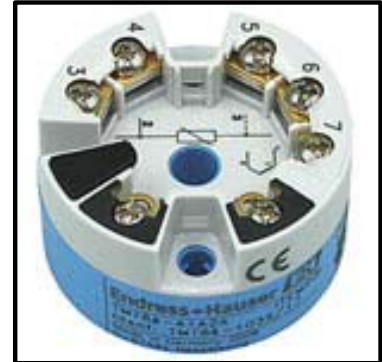
Order information:

Type	Version	
INT5335	Standard	: A
	EEx	: D

TMT162

R/I Head Transmitter (Foundation™ Fieldbus)

Dual-Input Temperature Head Transmitter with FOUNDATION™ Fieldbus communication



Application:

- Temperature head transmitter with 2 input channels and FOUNDATION Fieldbus™ protocol for the conversion of different input signals into digital output signals
- The iTEMP® TMT84 stands out due to signal reliability, long-term stability, high precision and advanced diagnostics (important in critical processes)
- For the highest level of safety, availability and risk reduction
- Usable for resistance thermometer (RTD), thermocouple (TC), resistance transmitter (Ω), voltage transmitter (mV)
- DIN B style head transmitter to fit in the smallest connection heads or in remote housings

Technical Characteristics:

- Easy and standardized communication via FOUNDATION Fieldbus™ H1
- Meets the EMC requirements as per NAMUR NE21 and the recommendations of NE89 with regard to temperature transmitters with digital signal processing
- Straightforward design of measuring points in Ex-areas through FISCO/FNICO conformity in accordance with IEC 60079-27
- Safe operation in hazardous areas thanks to international approvals such as
 - FM IS, NI
 - CSA IS, NI
 - ATEX Ex ia, Ex nAfor intrinsically safe installation in zone 1 and zone 2
- High accuracy through sensor-transmitter matching
- Reliable operation with sensor monitoring and device hardware fault recognition
- Several mounting versions and sensor connection combinations
- Rapid no-tools wiring due to optional spring terminal technology

A.8.4 Air Purge Unit - LSP compact

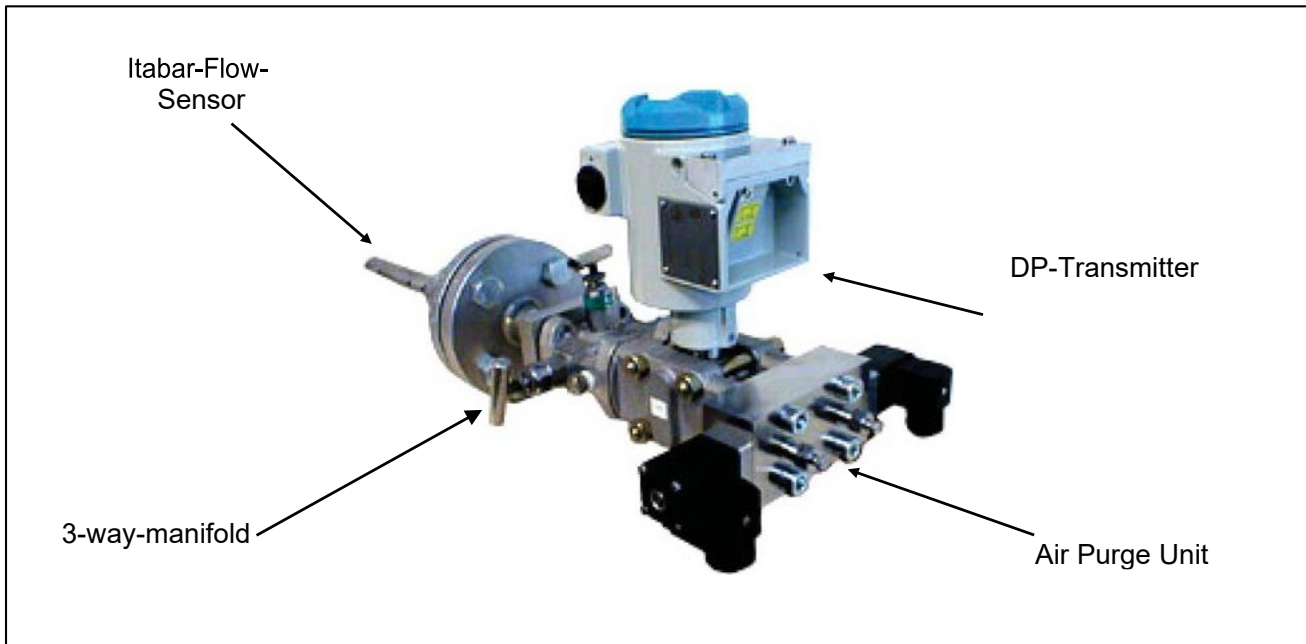


Fig 31: Air Purge Unit – LSP-compact, mounted to a measuring unit based on an Itabar.

Description

When measuring the flow of emissions or air containing particles it is possible that particles attach themselves in- and outside of the sensor walls, and – depending on the degree of coating – reduce the measurement accuracy or even eliminate the signal from the sensor altogether.

To manually clean the DP sensor in regular intervals is in many instances not a practical solution. The removal, thorough cleaning and re-installation is time consuming and expensive. Furthermore no signal is available during the cleaning process.

The LSP-compact air-purge unit allows such regular cleaning to be done automatically and with considerable cost savings.

The LSP-compact unit mainly consists of a purge block with a 2/2-way-valve which is directly addressable via a customer supplied relay or SPS. It is also possible to activate the LPS via the DigiFlow flow computer. The DigiFlow is programmable for purge duration, purge frequency, Slowingdown time. At the same time the DigiFlow maintains the last signal value during the cleaning process.

The LPS is delivered with all necessary mounting hardware and is installed by screwing one side of the purge block directly onto the DP transmitter. The pressure piping is attached to the other side. The vent screws are threaded into the purge block. It is thus ensured that not only the sensor but also the sensing chambers of the DP transmitter are purged of impurities. The standard ½" NPT connections for the purge air supply are located on the sides of the block.

This compact design with few components avoids more complicated installation procedures in a separate enclosure.

Specifications Air Purge Unit LSP-compact

Medium:	Air
Valve type:	2/2-way-valve, direct-controlled
Funktion:	normally closed
Kv- flow value:	1.01 GPM
Nominal stroke	0.04 inches
On-time:	100 %
Material of internal parts:	Stainless steel
Material gaskets:	FPM
Connection:	¼" NPT
Orientation:	user selectable
Nominal size:	0.12 inches
Leak rate:	bubble tight
Protection class:	I
Isolation class:	F
Protection:	IP65 / NEMA 4 (IEC 144)
Material of purge block:	Alumium or 316Ti (1.4571)

Versions:	w/o Ex-protection	EEx d-Version
Ex protection:	NON	EEx d IIC T4/T5 TO EN 50014 and EN 50018
Nominal voltage:	230 V/50 Hz 115 V/50 Hz and 24 VDC	230 V/50 Hz, 115 V/50 Hz, 24 V DC and 24 V/50 Hz
Electrical connections	to DIN 43650	Cable H05RN-F3G, 3x0,75 mm ³ , 3 m long with cable glands and strain relief
Power consumption:	21 VA (start up); 12VA/8 W (oper.)	Nominal power cons. 7 W
Max. air supply pressure:	88.2 psi	58.8 psi
Medium temperature:	-34...+323 °F	-34...+306 °F
Environmetal temperature:	max. +187 °F	max. +136 °F

Code	w/o Ex-protection			Ex protection EExdIIC T5			
Mat. of purge block:	230 V 50 Hz	115 V 50 Hz	24 V DC	230 V 50 Hz	115 V 50 Hz	24 V 50 Hz	24 V DC
Aluminium	EJG-1A	EJG-2A	EJG-3A	EJG-6A	EJG-7A	EJG-8A	EJG-9A
St. St. (1.4571)	EJG-1S	EJG-2S	EJG-3S	EJG-6S	EJG-7S	EJG-8S	EJG-9S

A.8.5 Digiflow 515 - Flow Calculator

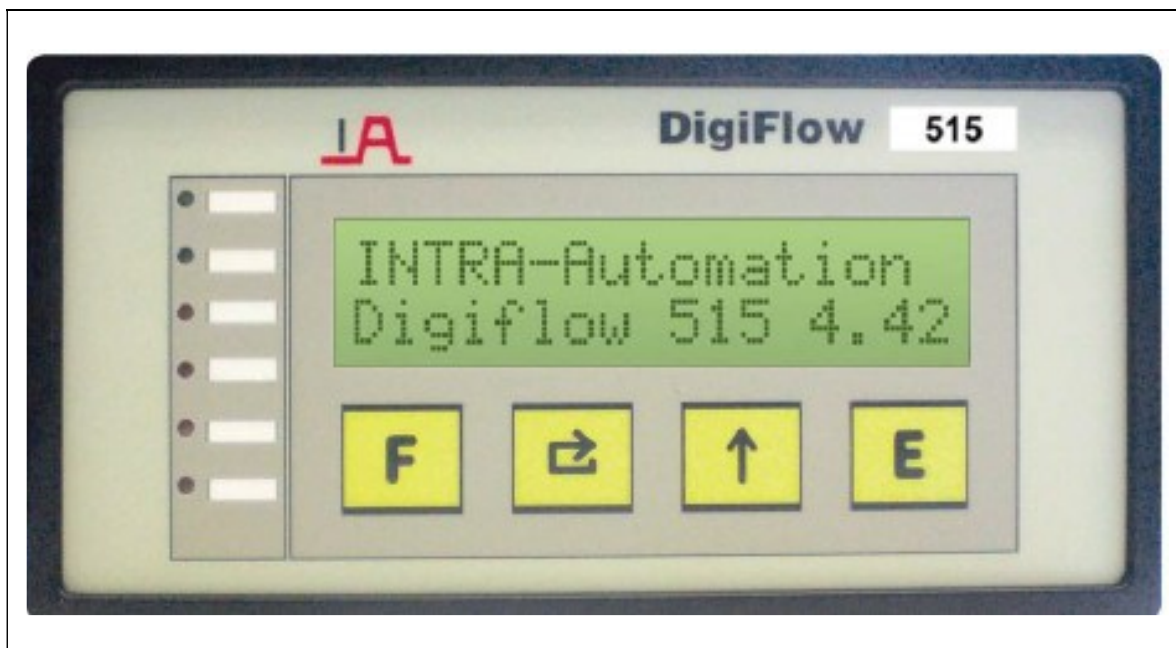


Fig. 32: Front view DigiFlow 515

**Microprocessor Gas and Steam Flow Computer
Energy Flow Computer (Consumption and Enthalpy for Steam)**

DigiFlow 515

Functions:

- Indication of flow rate and total volume, mass and energy
- Temperature and pressure compensation
- Input Signals 4...20 mA analogue or frequency or flow input
- Dual ranged d.p. transmitter inputs
- Simplified programming
- User menus in three languages
- Control of sensor purge unit
- Data logging output

The DigiFlow 515 combines compensation for gas and vapors acc. to the following equations:

1. *Ideal Gas*: Temperature and pressure correction; compressibility correction not required.
2. *General Gas*: Temperature and pressure correction with compressibility correction calculated using the Redlich-Kwong¹ state equation. This equation is suitable for gases with known properties. Information about common industrial gases is provided in the operating manual.
3. *Natural Gas*: Compressibility is calculated using the AGA-NX-19-mod equation for natural gases of low gross caloric value.
4. *Steam Flow Computer*: Based on the IFC 1967. Mass flow correction of the flowing steam using pressure and temperature.
5. *Energy*: The heat quantity is calculated based on enthalpy and mass flow. (for steam)
6. *Energy Balance*: Assuming a mass balance in upstream-and downstream pipe, an energy balance of the loop is calculated. (for steam in upstream)

Inputs from various flow meters are accepted. Examples of these sensors are (VORTEX), turbine, orifice plate, averaging pitot tubes like (Itabar-Flow sensor), wedges and target flow meters. To increase the measured flow range of an Itabar-Flow sensor, it is possible to use two differential pressure transmitters whose ranges overlap with automatic crossover in the computer.

¹ Redlich & Kwong "An Equation of State", Chem Rev., vol. 44, p 233, 1949

The backlit two rows alphanumeric display shows the instantaneous readings of Flow or Totals, and the four key touchpad it is used to program and configure the unit.

All DigiFlow 515's are equipped with 4 analog inputs 4 – 20mA, 2 frequency inputs and 2 Pt100-inputs for RTD according to DIN 43760 in 2-,3- or 4-wire connection.

A scaleable pulse output to drive external counters, 2 relay outputs for Low/High-Flow alarms and an RS232 interface are also standard features of the DigiFlow 515.

Optionally there are up to two scaleable analogue outputs available.

There is also a capability to control a sensor purge unit for automatic purge control in hazardous environments.

The pulse output and the alarm outputs operate proportionally to the mass, corrected volume or energy depending on which value will be displayed as Standard Display.

The analogue output can be assigned to one of measured or calculated values, indicated on the display.

The RS232/RS485 Interface will output all parameters which are displayed. This can be done to a printer or a host computer.

An integrated real time clock is included to send protocols in selectable intervals, up to 9999min. Accumulated totals may be reset.

The Totals can be reset by pressing the related key on the keyboard or by a voltage input at the related rear-terminal jack.

The DigiFlow 515 is powered by AC of 115/230 VAC 50/60 Hz. Optionally voltages between 24 and 28 V AC/DC.

The DigiFlow 515 provides an adjustable voltage of 18V DC for powering sensors. Maximum current is 100mA.

Flow meter inputs

Most types of flow meters can be used in conjunction with the DigiFlow 515. Including:

1. *Linear frequency producing* flow meters like (VORTEX), turbines or positive displacement.
2. *Non-linear frequency producing* flow meters.
A 12 point correction curve can be programmed to linearize the signal.
3. *Volumetric* flow meters with outputs of 4 – 20mA such as (VORTEX) or turbine meters with a frequency to current converter on the output.
4. *Differential Pressure devices* for ITABAR-sensors or orifice plates, where a square law relationship applies.
5. *Linear Differential Pressure devices* where the 4 – 20mA output is proportional to the flow rate.
6. *Dual Range Differential Pressure devices* where two separately spanned transmitters are used across a common flow device (ITABAR-sensor).
7. *Non-linear Differential Pressure devices* like laminar flow tubes.
A 12 point correction curve can be programmed to linearize the signal

Parameters displayed

During operation the display shows information which is to be selected by pressing the SCAN-key.

After one minute, without any key pressed, the display will return to the selected standard-display.

Standard Display:

- Mass, corrected volume or energy flow rate in units per day, hour, minute or second.
- By pressing the TOTAL-key the display changes to display the accumulated totals of mass, volume or energy. These counters can be reset by pressing the RESET key if allowed.

Gas Flow:

- Corrected volume (Nm³ or SCF)
- Mass (kg or lbs)
- Temperature (°C or °F) and pressure (kPa or psi)
- Compressibility (except ideal gas)
- Date and time

Steam Flow:

1. Mass (kg or lbs)
2. Energy (MJ or BTU)
3. Temperature (°C or °F) and pressure (kPa or psi) in upstream
4. Specific weight (kg/dm³) and enthalpy (dm³/kg or kJ/kg) in upstream
5. Temperature (°C or °F) and pressure (kPa or psi) in downstream
[only for energy-balance]
6. Specific weight (kg/dm³) and enthalpy (dm³/kg or kJ/kg) in downstream
[only for energy-balance]
7. Date and time

Itabar-Flow-Sensors

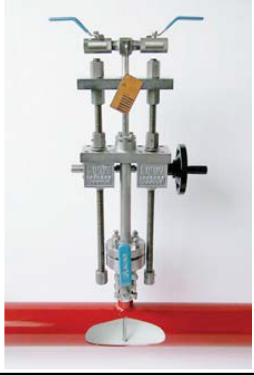
B Itabar-Flow-Sensors for Fluids and Gases

B.1 General Information

B1.1 Selection Criteria

The following tables allow to select a model series depending on the given measurement task, the operating pressure, the operating temperature as well as the desired installation and assembly design.

	IBR	IBF	IBF-100
  			
Installation / Removal WITH Process Shut Down			
Measurement task:			
Measurement of liquids, gases and gas mixtures	✓	✓	✗
Measurement of flue gases	✓	✓	✓
Possible operating pressure:			
6 bar; 16 bar	✓	✓	✓
40 bar; 63 bar	✓	✓	✗
100, 160, 250, 320 and 400 bar	✗	✓	✗
Max. operating temperature:			
200°C (25 bar)	✓	✓	✓
1175 °C, material dependent	✗	✓	✓
Material of mounting parts:			
Carbon steel, 1.4571	✓	✓	✓
1.4462 Duplex, Alloy-C4 (2.4610), -400, -825, Monel, PVDF	✗	✓	✓
Sensor materials:			
316L/316Ti (standard)	✓	✓	✓
1.4432 (Duplex) Inconel, Monel	✗	✓	✗
1.4539, Alloy-C4 (2.4610), -400, -825, PVDF	✗	✓	✓
3.7035 (Titanium Gr. 2)	✗	✓	✗
Design features:			
Threaded connection with mounting stud and screw-down-nut for installation of sensor to pipe	✓	✗	✗
Flanged connection to install the sensor to pipe	✗	✓	✓
Opposite end support with threaded removable blind flange for ease of sensor cleaning	✗	✗	✓

Installation / Removal WITHOUT Process Shut Down	FTN	FTM	FTH
			
Measurement task:			
Measurement of liquids, gases and gas mixtures	✓	✓	✓
Measurement of flue gases	✓	✓	✓
Possible operating pressure:			
6 bar; 16 bar	✓	✓	✓
16 bar; 40 bar	✗	✓	✓
63 bar; 100 bar	✗	✗	✓
Max. operating temperature:			
200°C	✓		
300°C		✓	
400°C			✓
Material of mounting parts:			
Carbon steel, 1.4571	✓	✓	✓
1.4462 Duplex, Alloy-C4 (2.4610), -400, -825, Monel, PVDF	✗	✗	✓
Sensor materials:			
316L/316Ti (standard)	✓	✓	✓
1.4432 (Duplex) Inconel, 1.4539, Alloy-C4 (2.4610), Monel; 1.4539, Alloy-C4 (2.4610); Titanium	✗	✗	✓
Design features:			
Threaded connection with mounting stud and screw-down-nut for installation of sensor to pipe	✓	✗	✗
Flanged connection to install the sensor to pipe	✗	✓	✓
Protective safety chain during removal	✓	✗	✗
Threaded rods for easy extraction	✗	✓	✓
Optional: Gear box with hand wheel	✗	✓	✓

B.1.2 Sensor Heads and Mounting Parts



Fig. 33: Sensor head with 1/2" NPT, only for gases and liquids



Fig. 34: Sensor head with flange plate acc. IEC61518 to direct-mount a 3-way manifold. Limited use w/out pipe insulation, gases to pressuremax = 63 bar (926 psig) and tempmax = 200 °C (680°F) liquids to pressuremax = 63 bar (926 psig) and tempmax = 150°C (510°F)



Fig. 35: Threaded weld boss for IBR-25/26 mat. Carbon steel, 316 SS



Fig. 36: Installation stud in weld-o-let version

Dimension „H“ (Mounting stud length)

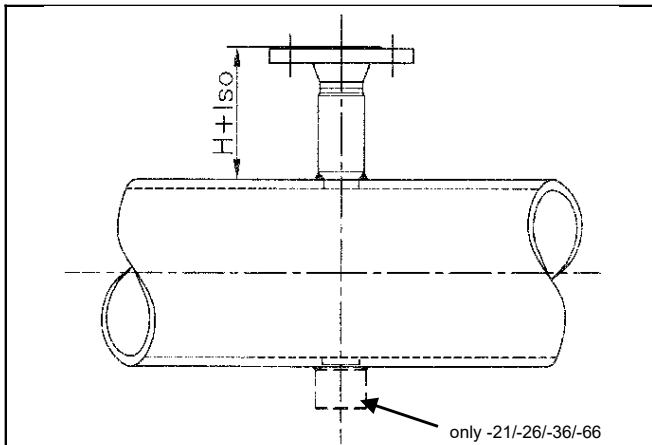


Fig. 37: Dimension H for flanged process connection

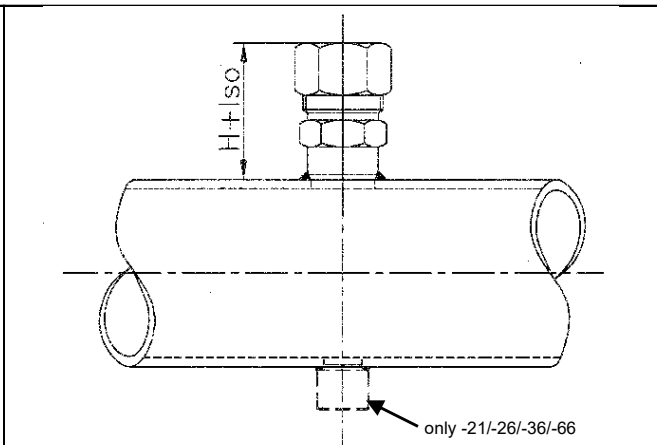


Fig. 38: Dimension H for threaded process connection

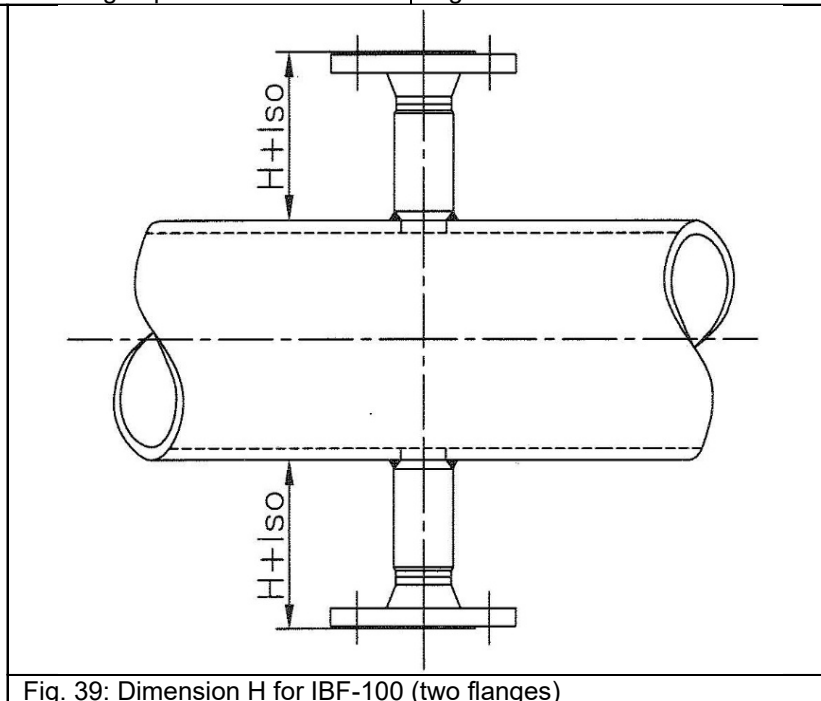


Fig. 39: Dimension H for IBF-100 (two flanges)

ISO = thickness of insulation (if applicable)

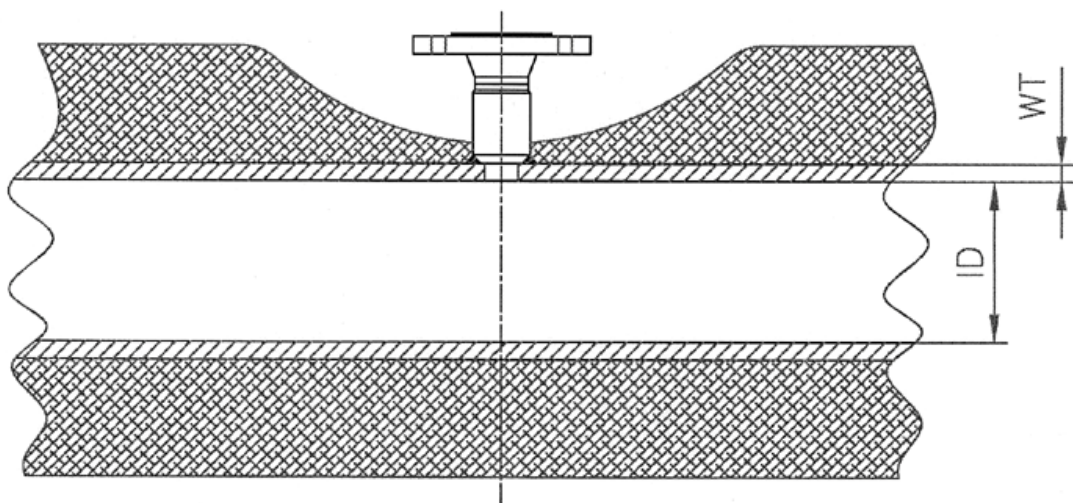
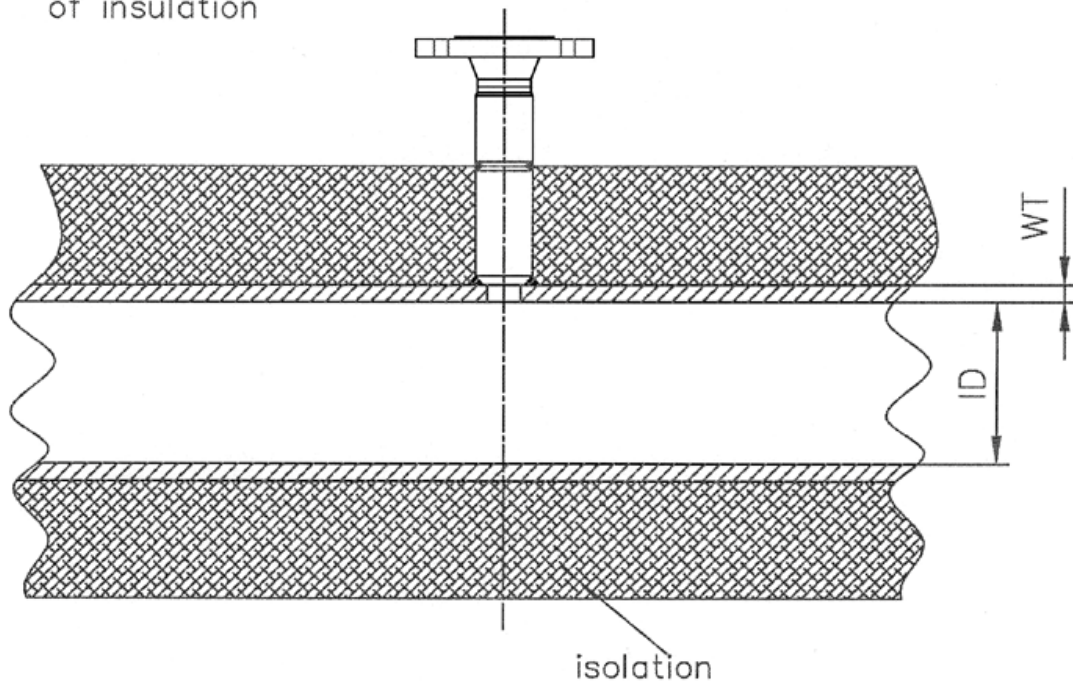
Sensor Type	IBR	IBF*	Itabar®-Series		
			FTN	FTM	FTH*
-20/21	50 mm + ISO	80 mm + ISO	50 mm + ISO	50 mm + ISO	80 mm + ISO
-25/26	68 mm + ISO	127 mm + ISO	50 mm + ISO	50 mm + ISO	127 mm + ISO
-35/36	60 mm + ISO	150 mm + ISO	50 mm + ISO	50 mm + ISO	150 mm + ISO
-65/66		146 mm + ISO			146 mm + ISO
-100		150 mm + ISO			

Important: The indicated H-dimensions are only valid for applications without insulation. If the pipe is insulated, please add the thickness of the insulation to the related H-dimension.

* Only for pressure ratings up to PN 100 [600 #], higher ratings on request.

B.1.3 Heat Insulation

"Installation stud extension – so that fitting is outside of insulation"



"If an extension is not included, the isolation must be reduced – increased insulation effort"

B.1.4 Saddle Flange Version

for Cast / Pig Iron, Steel and AZ Pipes (Asbestos-Cement-Pipe)

The saddle flange version is a special assembly version for pitot tubes in cast iron, steel and asbestos steel pipes. Common pipe diameters are between 2 ¼" to 20" (DN 65 to DN 500). Larger nominal sizes can be realized on request.

The picture on the right side shows a pitot tube sensor type IBF-25 in saddle flange version. This version consists of a drill-clamp with flange PN 4 / 58.0 psi (gas) / PN 16 / 232.1 psig (water) and, at least, one saddle clamp.

Saddle flange versions are not available for flow sensors with opposite end support.

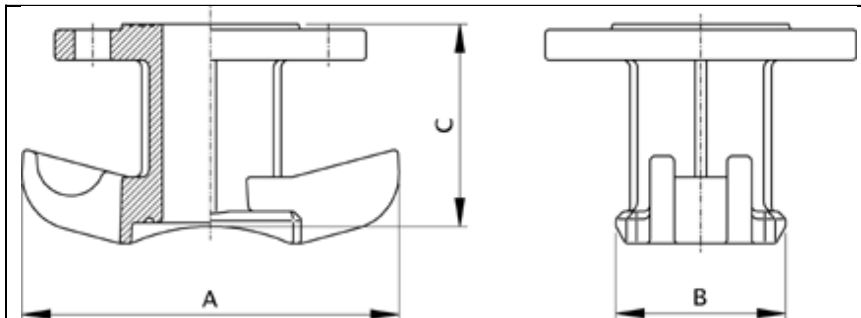
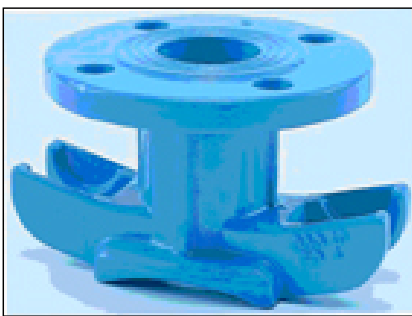
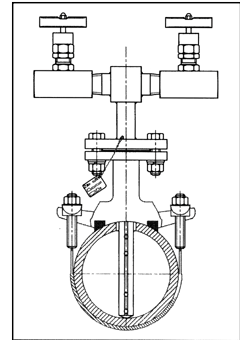


Fig 40: Universal drill-clamp with flange pipe size 2" DN 40/50 PN 4 / 58.8 psig (gas) / PN 16 / 235.2 psig (water)

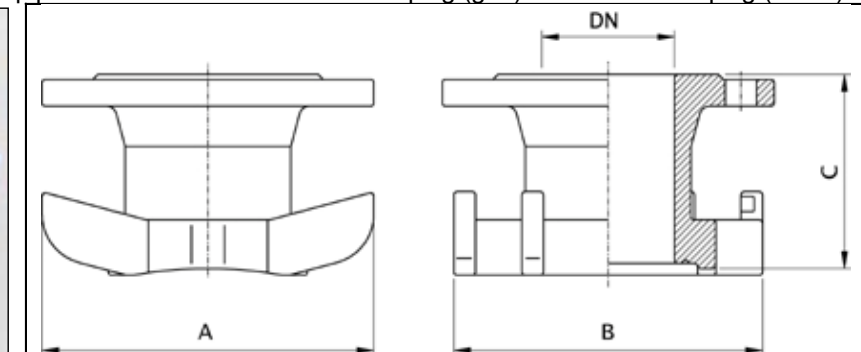
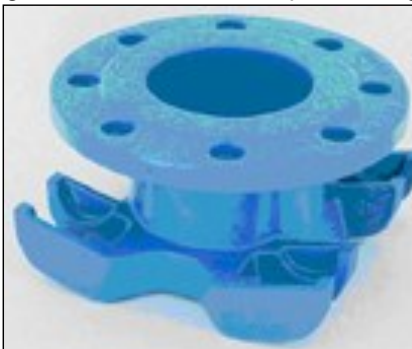


Fig 41: Double saddle clamp- drill-clamp with flange pipe size 3" / DN 80 PN 4 / 58.8 psig (gas) / PN 16 / 235.2 psig (water)



Fig. 42: Saddle clamp, fully vulcanized



Fig. 43: Saddle clamp, stainless, acid-resistant steel (304SS)

Itabar-Flow-Sensors

	Saddle clamp, fully vulcanized	Saddle clamp, 304 SS	Saddle clamp for AZ-pipes
Figure:	42	43	without
Use for pipe types:			
♦ welded pipe acc. DIN 2060	✓	✓	✗
♦ welded pipe with PE-cover to DIN 36670	✓	✓	✗
♦ Cast pipe to DIN 28610 bitumized	✓	✓	✗
♦ Cast pipe w/ PE-cover to DIN30674 T 1	✓	✓	✗
♦ Cast pipe to DIN 28610 w/ ZM-cover	✓	✓	✗
♦ Asbestos-cement-pipe 10 bar (145 psig)	✗	✓	✓
♦ Asbestos-cement pipe 12,5 bar (181.3 psig)	✗	✗	✓
♦ Asbestos-cement-pipe 16 bar (232.1 psig)	✗	✗	✓
Pipe outside diameter:	87-470 mm (3.4-18.5")	75-582 mm (2.9-22.9")	97-494 mm 3.8-19.4"
Width of saddle:	70 mm (2.7")	65 mm (2.6")	90 mm (3.5")
Material of saddle:	Carbon Steel, fully vulcanized	1.4301 (304SS)	1.4301 (304SS)
Saddle gasket:	NBR	NBR	NBR
Order code (x= pipe outside Ø in mm):	HB1-x	HB2-x	HB3-x

B.1.5 Material Overview

Material No.	Temp. Range	Application	Properties
316Ti (standard)	550°C 1022°F	Extraction facilities, dryers, mixing- and batching facilities, evaporators, distilleries, and other	The Cr-Ni-Mo alloyed material is very resistant against reducing organic and inorganic acids, as well as against halogen-containing media. This steel is furthermore less susceptible to selective corrosion. The titanium stabilized material exhibits slightly better heat properties with somewhat less resistance to acids.
1.4462 (st. steel)	Duplex	Sea water desalination plants, petro-chem industry, off-shore technology, evaporators, extraction facilities, distilleries, dryers	Good mechanical properties combined with high resistance against general corrosion, tear- and oscillation corrosion.
1.4539 (st. steel)	450-800°C 842-1472°F	Flue gas sulfur elimination (scrubbers), below dew point	The material is a highly acid resistant specialty steel with particularly good resistance to sulfuric and phosphoric acid at concentrations of up to 70% and operating temperatures of up to 80°C. Furthermore this material is resistant against concentrated organic acids, even at high temperatures, as well as against salt- and soda solutions. The steel is especially insensitive to selective corrosion and tear corrosion.
2.4610 NiMo16Cr16Ti Hastelloy C4	650-1040°C 1202-1904°F	Flue gas sulfur elimination (scrubbers), chlorine gas	Excellent stability in the chemical process industry against strong oxidizing media, hot contaminated mineral acids, solvents, chlorine- and chlorine contaminated media (organic and inorganic), anhydrous bleach acid, formic acid, distilled vinegar, Essighydrid-, seawater, and The alloy exhibits great ductile strength and resistance to corrosion even in temperatures of 650 – 1040°C. Resistant to build-up of Korngrenzkriben and is therefore in most cases usable without heat treatment after welding.
1.4876 X10NiCrAlTi33 20 Incoloy 800	900°C 1652°F	Hydrogen facilities	This alloy is resistant against corrosion from hydrogen and hydrogen sulfides as well as against tension corrosion.
2.4816 NiCr15Fe Inconel 600	1150°C 2102°F	air heaters	Excellent oxidation resistance up to 1150°C with superb general resistance to corrosion. Good mechanical properties even in low temperatures. Because of its resistance to chloride-corrosion this alloy is also used in nuclear reactor components. Can be welded w/out heat treatment.
2.4360 NiCu2Ofe Monel	425-550°C 797-1022°F	Extraction facilities, dryers, mixing – and batching plants, evaporators distilleries, sea water desalination plants	The Cr-Ni-Mo alloyed material is very resistant against reducing organic and inorganic acids, as well as against halogen-containing media. This steel is furthermore less susceptible to selective corrosion. The titanium stabilized material exhibits slightly better heat properties with somewhat less resistance to acids.
PVDF	-40 - +120°C -40°F -+248°F	Chemical plants, flue gas cleaning (scrubbers), filter technology	Well suited for many aggressive acids, many solvents and cleaning agents, hot water resistant
1.5415 15 Mo 3	530°C 986 °F	High pressure steam applications	
1.7335	550°C 1022°F	High pressure steam applications	
1.7380 10 CrMo 4 4	570°C 1058°F	High pressure steam applications	
1.4903 10 CrMoVNB 91	650°C 1202°F	High pressure steam applications	High pressure steam, energy and environmental technologies, chemicals/ petro-chem, oil- and gas industries, cryogenics, food and beverage industry, plastics
1.4841 314L	1150°C 2102°F		

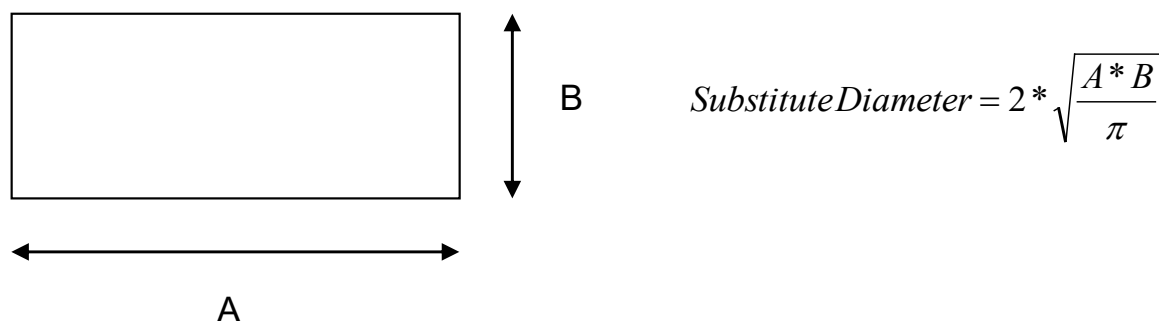
Itabar-Flow-Sensors

B.1.6 Technical Specifications

Sensor materials			
DIN	Commercial Designation	AISI	UNS
1.4571 (Standard)	316Ti	316Ti	S31635
1.4462	Duplex		S31803
1.4539			N08904
2.4610	Hastelloy C4		N06455
1.4876	Incoloy 800		008811
2.4816	Inconel 600		N06600
2.4360	Monel		N04400
PVDF			-
1.5415	15 Mo 3		K12020
1.7335	13 CrMo 44		K11562
1.7380	10 CrMo 910		-
1.4903	X 10 CrMoNVb	B 348 Gr. 2	-

Pipe inside diameter	1 ½" – 480" (DN 20 - DN 12000)
Max. operating pressure	PN 400 / 5880 psig (depending on sensor type)
Max. operating temperature	1200°C (4080°F) (depending on sensor material)
Accuracy	± 0,3 % of full scale

- ◆ Low permanent pressure loss (energy savings)
- ◆ Applicable from Re = 3150
- ◆ Direct mass flow measurement (integrated temperature and flow measurement)
- ◆ Direct-mount onto electr. DP transmitter
- ◆ Low contamination due to large pressure sensing ports
- ◆ Itabar-Flow-Sensors with certified accuracy, tested at water calibration facility ABB Göttingen / Germany. All sensor types from DN 400 (16") to DN 1600 (64") have been calibrated and tested – see test protocols.
- ◆ Material certificates available in 3.1 and 3.2
- ◆ FloTap-versions allow installation and removal under pressure (wet-tap)
- ◆ Flow measurement in rectangular or square ducts is possible.



The sensor is always made for the longer side to better cover the flow profile.

- ◆ Shorter straight pipe run requirements as compared to orifice plates and nozzles.

B.1.7 Installation Position (Liquids and Gases)

1. **Gases**, if possible the sensor should be inserted into the pipe from the top or from the side. In case the gas contains moisture, liquid drops can migrate back into the measurement chambers. If the sensor is installed into the bottom of a pipe an increase in the liquid column can cause measurement errors.



Fig. 44: Recommended orientation for measurement of gases

2. **Liquids**, sensor installation from side or from below into pipe, never from above (as opposed to gases). Air bubbles rise and cause measurement errors, transmitter always below the pressure connections.



Fig. 45: Recommended sensor orientation for liquid measurement

Itabar-Flow-Sensors

IB

B.2 Itabar for Liquids and Gases (fixed installation)

IBR

B.2.1 Itabar with threaded process connection

Types: IBR-15/20/21/25/26 up to 588 psi) and IBR-35/36 (up to 235 psi)

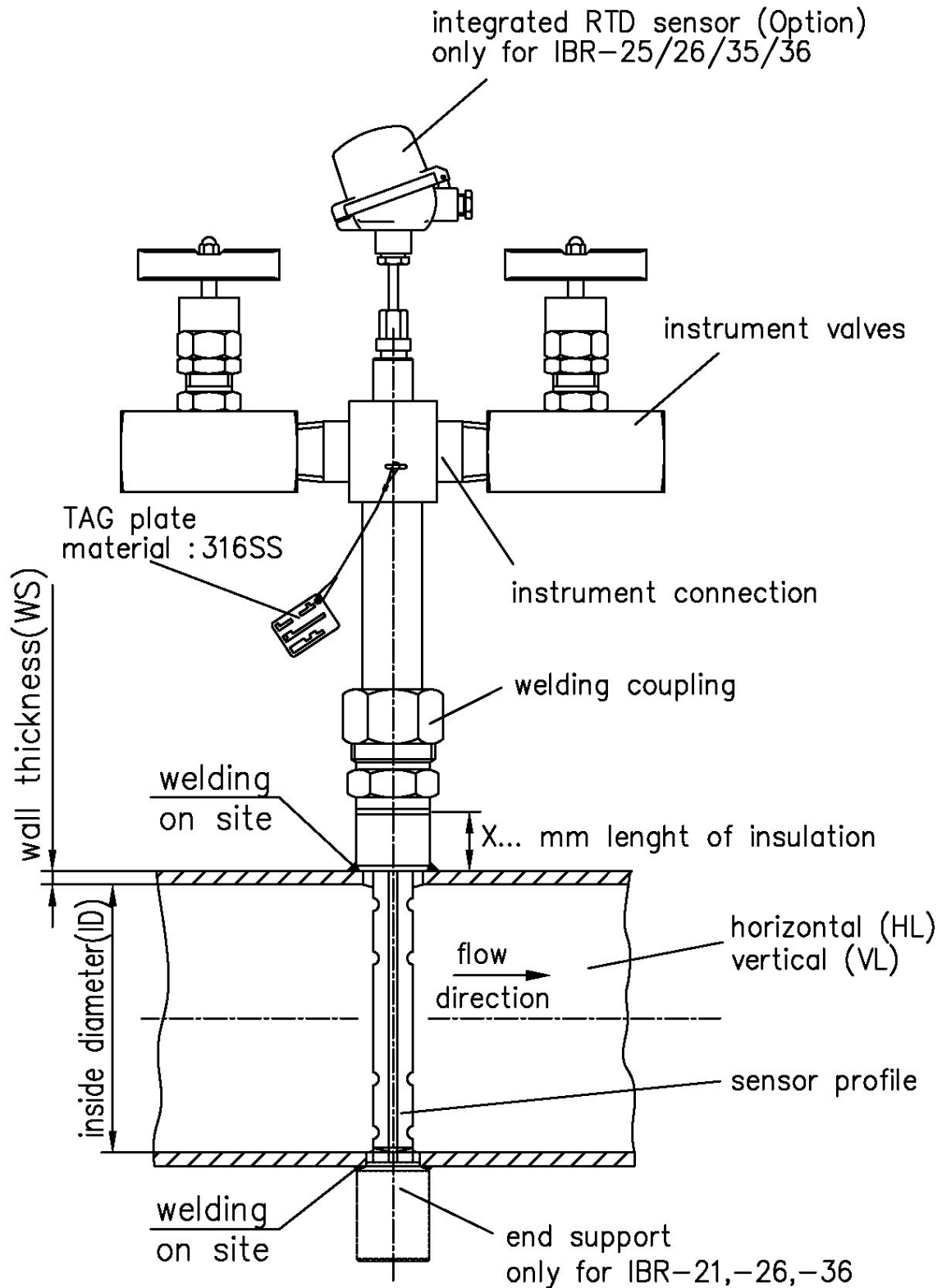
a.) Description:

The Itabar®-Flow-Sensors series IBR is used for measuring volumetric flow of liquids and gases. It is designed to be installed through thread weld-o-let pipe mounting parts. It offers a good price / performance ratio in applications with no high temperature or pressure requirements. Standard sensor material is 316 SS. The design is such that the Δp -transmitter can be integrally mounted onto the sensor via an optional 3-way-manifold. An optional RTD temperature sensor is available for mass flow measurement.



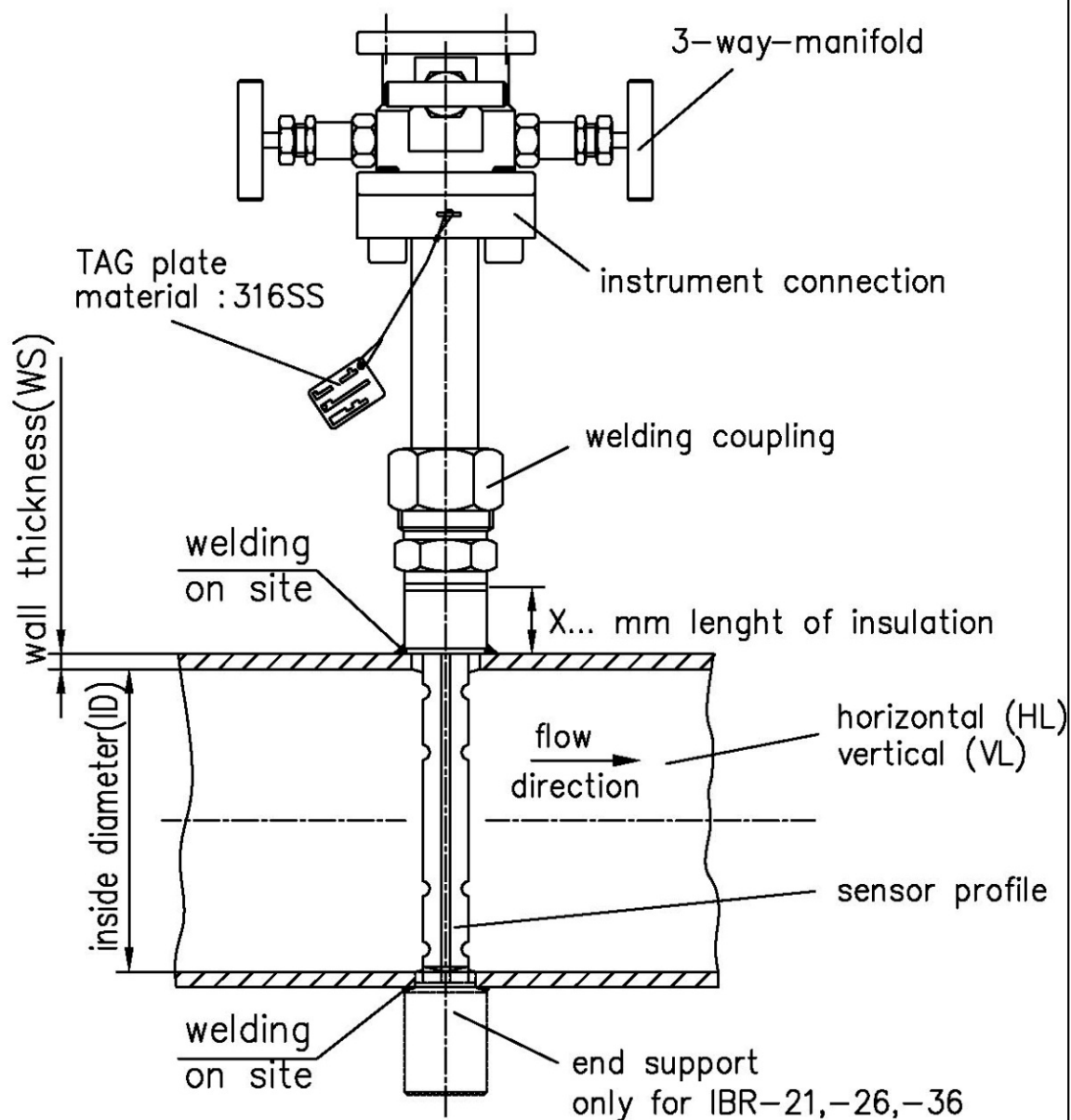
b.) Drawings for IBR

separate installation of sensor and transmitter



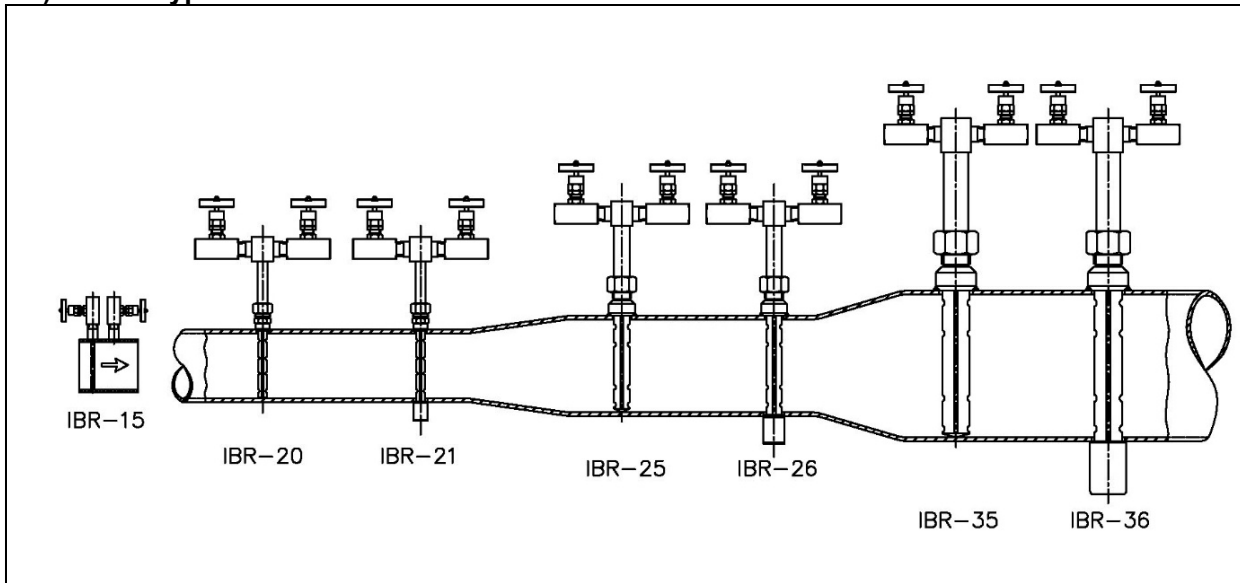
Itabar-Flow-Sensors

compact version electr. d.p.transmitter mounted onto the flow sensor (only with A06)



c.) Order Data for IBR-15/20/21/25/26/35/36

c.1) Sensor type:



Pipe Size DN	Pipe Size Inches	Max. volumetric flow m³/h						
		IBR-15	IBR-20	IBR-21	IBR-25	IBR-26	IBR-35	IBR-36
DN 25	1	16	---	---	---	---	---	---
DN 32	1 ¼	21	---	---	---	---	---	---
DN 40	1 ½	---	36	91	---	---	---	---
DN 50	2	---	51	112	---	---	---	---
DN 65	2 ¼	---	78	172	---	---	---	---
DN 80	2 ½	---	107	257	---	---	---	---
DN 100	4	---	143	340	241	563	---	---
DN 125	5	---	---	---	334	776	---	---
DN 150	6	---	---	---	441	1021	---	---
DN 200	8	---	---	---	630	1452	---	---
DN 250	10	---	---	---	817	1879	---	---
DN 300	12	---	---	---	1015	2333	1893	4360
DN 350	14	---	---	---	1211	2783	2266	5214
DN 400	16	---	---	---	1400	3217	2615	6016
DN 500	20	---	---	---	1792	4119	3339	7680
DN 600	24	---	---	---	2175	5001	4077	9378
DN 700	28	---	---	---	2568	5905	4839	11133
DN 800	32	---	---	---	2981	6858	5618	13929
DN 900	36	---	---	---	3411	7851	6411	14756
DN 1000	40	---	---	---	3852	8867	7212	16604
DN 1200	48	---	---	---	4730	10891	8815	20301
DN 1400	56	---	---	---	5587	12869	10412	23985
DN 1600	64	---	---	---	6417	14786	12007	27667
DN 1800	72	---	---	---	---	---	13538	31202
DN 2000	80	---	---	---	---	---	15067	34730

These values are for water of $\rho = 0,9982 \text{ kg/l}$ SGU and at a temperature $T = 20 \text{ }^{\circ}\text{C}$. To calculate volumetric or mass flow of fluids with other densities see chapter 6 „Specifications of DP Sensors with WINFLOW“.

Itabar-Flow-Sensors

d) Order Specifications for Itabar-Flow-Sensors, Series IBR

d1) IBR-20/21

ITABAR®-FLOW-SENSOR for Liquids and Gases, threaded connection.	
Code	Description
1. Type:	
IBR-20	Sensor Ø12mm prepared for cutting ring process connection (max. PN40) for liquids and gases without end support
IBR-21	Sensor Ø12mm prepared for cutting ring process connection (max. PN40) for liquids and gases with end support
2. Pipe (duct) size: (ID/WT):	
DN040	DN 40 / 1-1/2"
DN050	DN 50 / 2"
DN065	DN 65 / 2-1/2"
DN080	DN 80 / 3"
DN100	DN 100 / 4"
Y9	others, please specify
3. Material sensor:	
V	1.4571 / 316Ti
Y	Special design
4. Welding coupling:	
000	without
001	material: C22.8 (similar A105)
003	material: 1.4571 / 316Ti
031	material: C22.8 (similar A105) with saddle plate, material: 1.4571/1.4301
041	material: C22.8 (similar A105) with saddle plate, material: 1.4571/1.4301 w. rubber gasket
033	material: 1.4571 / 316Ti with saddle plate, material: 1.4571/1.4301
043	material: 1.4571 / 316Ti with saddle plate, material: 1.4571/1.4301 w. rubber gasket
Y9	Special design
5. End support:	
00	without
01	material: C22.8 (similar A105)
03	material: 1.4571/316Ti
11	material: C22.8 (similar A105) with saddle plate, material: 1.4571/1.4301
21	material: C22.8 (similar A105) with saddle plate, material: 1.4571/1.4301 w. rubber gasket
13	material: 1.4571 / 316Ti with saddle plate, material: 1.4571/1.4301
23	material: 1.4571 / 316Ti with saddle plate, material: 1.4571/1.4301 w. rubber gasket
Y9	Special design
6. Pipe insulation:	
KI	without
X	insulation in mm (min. 50mm)
Y	Special design
7. Pipe run / flow direction:	
HL	horizontal, left
HR	horizontal, right
VD	vertical, down
VU	vertical, upwards
Y9	Special design
8. Integrated temperature sensor:	
T0	without
TA	3-wire, RTD -50 up to 400°C, without Ex approval, Sensor diameter=Ø0.5mm
TB	3-wire, RTD -50 up to 400°C, with Ex approval, Sensor diameter=Ø0.5mm
TC	thermocouple type K with INT5334-A3B non-ex-version; 4...20 mA output
TX	sensor prepared for PT100, probe diameter = Ø0.5mm (customer provision)
Y	Special design

Please see next page

IBR-20/21 continuation	
Code	Description
8.1 Head transmitter for integrated RTD:	
0	without
2	4...20 mA / without Ex approval
3	4...20 mA + HART / without Ex approval
4	Profibus PA / without Ex approval
5	Foundation Fieldbus / without Ex approval
6	4...20 mA /ATEX Ex ia
7	4...20 mA + HART / ATEX Ex ia
8	Profibus PA / ATEX Ex ia
9	Foundation Fieldbus / ATEX Ex ia
Y	Special design
9. Differential pressure connection:	
A03	1 pair of nozzles, MNPT1/2" (remote version)
A03A03	2 pair of nozzles, MNPT1/2" (remote version)
A03A03A03	3 pair of nozzles, MNPT1/2" (remote version)
A04	1 pair of nozzles, MNPT1/4" (remote version)
A04A04	2 pair of nozzles, MNPT1/4" (remote version)
A04G	1 pair of nozzles, R1/4" male thread (remote version)
A04GA04G	2 pair of nozzles, R1/4" male thread (remote version)
A04S	1 pair of tube nozzle Ø6x4x1 (remote version)
R12	1 pair of pipe Ø12x1,5x50mm, material: 1.4571 (316Ti)
A12	1 pair Weld-on fitting Ermeto 12S, material: 316SS (remote version)
AS2	1 pair welding connection Ø21.3x3,2mm - welding end (remote version)
AS3	1 pair welding connection Ø21.3x6,3mm - welding end (remote version)
AS4	1 pair welding connection Ø24x4,0mm - welding end (remote version)
A06	IEC 61518; PTFE gasket
A16	IEC 61518; Viton gasket
A26	IEC 61518; PTFE gasket, cranked (for integrated temperature sensor or humid gas)
A36	IEC 61518; Viton gasket, cranked (for integrated temperature sensor or humid gas)
Y99	Special design
10. Shut-off valve for remote version (initial shut-off):	
A00	without
A54G	1 pair ball valve PN40, mat.: CF8M (1.4408), female R1/4", packing: PTFE
A54GA54G	2 pair ball valve PN40, mat.: CF8M (1.4408), female R1/4", packing: PTFE
A56	1 pair ball valve PN40, mat.: CF8M (1.4408), female 1/2" NPT, packing: PTFE
A56A56	2 pair ball valve PN40, mat.: CF8M (1.4408), female 1/2" NPT, packing: PTFE
A56A56A56	3 pair ball valve PN40, mat.: CF8M (1.4408), female 1/2" NPT, packing: PTFE
A62	1 pair valve, PN400, housing: SS316/316L, female 1/2" NPT, packing: Graphite
A62A62	2 pair valve, PN400, housing: SS316/316L, female 1/2" NPT, packing: Graphite
A62A62A62	3 pair valve, PN400, housing: SS316/316L, female 1/2" NPT, packing: Graphite
A81	1 pair gate valve 800lbs. housing: A105, female 1/2" NPT, packing: Graphite
A82	1 pair gate valve 800lbs. housing: 316SS, female 1/2" NPT, packing: Graphite
AV1	1 pair valve, PN400, housing: C22.8 (A105),Ø21,3x6,3/Ø14,0x2,5 , packing: Graphite
AV2	1 pair valve, PN400, hsg: 1.4571 (316Ti),Ø21,3x6,3/Ø14,0x2,5 , packing: Graphite
AV3	valve, PN400, housing: 1.5415 (16Mo3),Ø21,3x6,3/Ø14,0x2,5 , packing: Graphite
Y99	Special design
10.1 First Shut-off accessories:	
0	without
E12	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø12mm, mat.: 316SS
E14	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø14mm, mat.: 316SS
Y99	Special design

Please see next page

Itabar-Flow-Sensors

IBR-20/21 continuation	
Code	Description
10.2 Manifold for remote variant:	
0	without
A65P	3-way-manifold, 316/316L, PN420 DN5, In/Out: 1/2"-NPTF/IEC61518-A, pkg: PTFE
A70P	5-way-manifold, 316/316L PN420 DN5, In/Out: 1/2"-NPTF/IEC61518-A, pkg: PTFE
Y99	Special design
10.2.1 Mounting set for remote version (manifold):	
0	without
MBC	mounting set, CS zinc-plated, for 2" pipe mntg, incl. screws 7/16-UNF/ FPM90-O-Ring
MBS	mounting set, stainless steel, for 2" pipe mntg, incl. screws 7/16-UNF/ FPM90-O-Ring
Y99	Special design
10.2.2 Accessories for manifold:	
0	without
E12	1 pair Ermeto-screw joints 1/2" NPT-M on Ø12mm, mat.: 316SS
E14	1 pair Ermeto-screw joints 1/2" NPT-M on Ø14mm, mat.: 316SS
Y99	Special design
11. Manifold for compact variant:	
A000	without
A66M	3-way-manifold, IEC 61518, material: 1.4404 (316L), pkg: PTFE, screws M10
A66U	3-way-manifold, IEC 61518, material: 1.4404 (316L), pkg: PTFE, screws 7/16-UNF
A71M	5-way-manifold, IEC 61518, material: 1.4404 (316L), pkg: PTFE, screws M10
A71U	5-way-manifold, IEC 61518, material: 1.4404 (316L), pkg: PTFE, screws 7/16-UNF
Y999	Special design
12. Special design/pre-assembly:	
0	without
M01	mounting of dp transmitter (customer provision)
M03	mounting of p transmitter (customer provision) with oval flange, mat. st.st.
A4	cleaned from oil+grease certificate
A5	oxygen service certificate
A6	PWIS free certificate (PWIS = paint-wetting impairment substances)
Y99	Special design

D2) Order Data for IBR-25/26

ITABAR®-FLOW-SENSOR for Liquids and Gases, threaded connection.	
Code	Description
1. Type:	
IBR-25	Sensor Ø25,4mm prepared for cutting ring process connection (max. PN40) for liquids and gases without end support
IBR-26	Sensor Ø25,4mm prepared for cutting ring process connection (max. PN40) for liquids and gases with end support
2. Pipe (duct) size: (ID/WT):	
DN100	DN 100 / 4"
DN125	DN 125 / 5"
DN150	DN 150 / 6"
DN200	DN 200 / 8"
DN250	DN 250 / 10"
DN300	DN 300 / 12"
DN350	DN 350 / 14"
DN400	DN 400 / 16"
DN450	DN 450 / 18"
DN500	DN 500 / 20"
DN600	DN 600 / 24"
DN700	DN 700 / 28"
DN800	DN 800 / 32"
DN900	DN 900 / 36"
DN1000	DN 1000 / 40"
DN1100	DN 1100 / 44"
DN1200	DN 1200 / 48"
DN1400	DN 1400 / 56"
DN1600	DN 1600 / 64"
DN1800	DN 1800 / 72"
DN2000	DN 2000 / 80"
Y9	others, please specify
3. Material sensor:	
S	1.4404 / 316L
V	1.4571 / 316Ti
Y	Special design
4. Welding coupling:	
000	without
001	material: C22.8 (similar A105)
002	material: 1.4404 / 316L
003	material: 1.4571 / 316Ti
031	material: C22.8 (similar A105) with saddle plate, material: 1.4571/1.4301
041	material: C22.8 (similar A105) with saddle plate, mat.: 1.4571/1.4301 w. rubber gasket
032	material: 1.4404 / 316L with saddle plate, material: 1.4571/1.4301
042	material: 1.4404 / 316L with saddle plate, material: 1.4571/1.4301 w. rubber gasket
033	material: 1.4571 / 316Ti with saddle plate, material: 1.4571/1.4301
043	material: 1.4571 / 316Ti with saddle plate, material: 1.4571/1.4301 w. rubber gasket
Y9	Special design

Please see next page

Itabar-Flow-Sensors

IBR-25/26 continuation	
Code	Description
5. End support:	
00	without
01	material: C22.8 (similar A105)
02	material: 1.4404 / 316L
03	material: 1.4571 / 316Ti
11	material: C22.8 (similar A105) with saddle plate, material: 1.4571/1.4301
21	material: C22.8 (similar A105) with saddle plate, mat.: 1.4571/1.4301 w. rubber gasket
12	material: 1.4404 / 316L with saddle plate, material: 1.4571/1.4301
22	material: 1.4404 / 316L with saddle plate, material: 1.4571/1.4301 w. rubber gasket
13	material: 1.4571 / 316Ti with saddle plate, material: 1.4571/1.4301
23	material: 1.4571 / 316Ti with saddle plate, material: 1.4571/1.4301 w. rubber gasket
Y9	Special design
6. Pipe insulation:	
KI	without
X	insulation in mm (min. 50mm)
Y	Special design
7. Pipe run / flow direction:	
HL	horizontal, left
HR	horizontal, right
VD	vertical, down
VU	vertical, upwards
Y9	Special design
8. Integrated temperature sensor:	
T0	without
TA	3-wire, RTD -50 bis 400°C, without Ex approval, Sensor diameter=Ø3,0mm
TB	3-wire, RTD -50 bis 400°C, Ex approval, Sensor diameter=Ø3,0mm
TC	thermocouple type K with INT5334-A3B non-ex-version; 4...20 mA output
TX	sensor prepared for PT100, probe diameter = Ø3,0mm (customer provision)
Y	Special design
8.1 Head transmitter for integrated RTD:	
0	without
2	4...20 mA / without Ex approval
3	4...20 mA + HART / without Ex approval
4	Profibus PA / without Ex approval
5	Foundation Fieldbus / without Ex approval
6	4...20 mA / ATEX Ex ia
7	4...20 mA + HART / ATEX Ex ia
8	Profibus PA / ATEX Ex ia
9	Foundation Fieldbus / ATEX Ex ia
Y	Special design

Please see next page

IBR-25/26 continuation	
Code	Description
9. Differential pressure connection:	
A03	1 pair of nozzles, MNPT1/2" (remote version)
A03A03	2 pair of nozzles, MNPT1/2" (remote version)
A03A03A03	3 pair of nozzles, MNPT1/2" (remote version)
A04	1 pair of nozzles, MNPT1/4" (remote version)
A04A04	2 pair of nozzles, MNPT1/4" (remote version)
A04G	1 pair of nozzles, R1/4" male thread (remote version)
A04GA04G	2 pair of nozzles, R1/4" male thread (remote version)
A04S	1 pair of tube nozzle Ø6x4x1 (remote version)
R12	1 pair of pipe Ø12x1,5x50mm, material: 1.4571 (316Ti)
A12	1 pair Weld-on fitting Ermeto 12S, material: 316SS (remote version)
AS2	1 pair welding connection Ø21.3x3,2mm - welding end (remote version)
AS3	1 pair welding connection Ø21.3x6,3mm - welding end (remote version)
AS4	1 pair welding connection Ø24x4,0mm - welding end (remote version)
A06	IEC 61518; PTFE gasket
A16	IEC 61518; Viton gasket
A26	IEC 61518; PTFE gasket, cranked (for integrated temperature sensor or humid gas)
A36	IEC 61518; Viton gasket, cranked (for integrated temperature sensor or humid gas)
Y99	Special design
10. Shut-off valve for remote version (initial shut-off):	
A00	without
A54G	1 pair ball valve PN40, mat.: CF8M (1.4408), female R1/4", packing: PTFE
A54GA54G	2 pair ball valve PN40, mat.: CF8M (1.4408), female R1/4", packing: PTFE
A56	1 pair ball valve PN40, mat.: CF8M (1.4408), female 1/2" NPT, packing: PTFE
A56A56	2 pair ball valve PN40, mat.: CF8M (1.4408), female 1/2" NPT, packing: PTFE
A56A56A56	3 pair ball valve PN40, mat.: CF8M (1.4408), female 1/2" NPT, packing: PTFE
A62	1 pair valve, PN400, housing: SS316/316L, female 1/2" NPT, packing: Graphite
A62A62	2 pair valve, PN400, housing: SS316/316L, female 1/2" NPT, packing: Graphite
A62A62A62	3 pair valve, PN400, housing: SS316/316L, female 1/2" NPT, packing: Graphite
A81	1 pair gate valve 800lbs. housing: A105, female 1/2" NPT, packing: Graphite
A82	1 pair gate valve 800lbs. housing: 316SS, female 1/2" NPT, packing: Graphite
AV1	1 pair valve, PN400, housing: C22.8 (A105), Ø21,3x6,3/Ø14,0x2,5 , packing: Graphite
AV2	1 pair valve, PN400, hsg: 1.4571 (316Ti), Ø21,3x6,3/Ø14,0x2,5 , packing: Graphite
AV3	valve, PN400, housing: 1.5415 (16Mo3), Ø21,3x6,3/Ø14,0x2,5 , packing: Graphite
Y99	Special design
10.1 First Shut-off accessories:	
0	without
E12	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø12mm, mat.: 316SS
E14	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø14mm, mat.: 316SS
Y99	Special design
10.2 Manifold for remote variant:	
0	without
A65P	3-way-manifold, 316/316L, PN420 DN5, In/Out: 1/2"-NPTF/IEC61518-A, packing: PTFE
A70P	5-way-manifold, 316/316L PN420 DN5, In/Out: 1/2"-NPTF/IEC61518-A, packing: PTFE
Y99	Special design
10.2.1 Mounting set for remote version (manifold):	
0	without
MBC	mounting set, CS zinc-plated, for 2" pipe mtg, incl. screws 7/16-UNF/ FPM90-O-Ring
MBS	mounting set, stainless steel, for 2" pipe mounting, incl. screws 7/16-UNF/ FPM90-O-Ring
Y99	Special design

Please see next page

Itabar-Flow-Sensors

IBR-25/26 continuation	
Code	Description
10.2.2 Accessories for manifold:	
0	Without
E12	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø12mm, mat.: 316SS
E14	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø14mm, mat.: 316SS
Y99	Special design
11. Valve block for compact variant:	
A000	without
A66M	3-way-manifold, IEC 61518, material: 1.4404 (316L), packing: PTFE, screws M10
A66U	3-way-manifold, IEC 61518, material: 1.4404 (316L), packing: PTFE, screws 7/16-UNF
A71M	5-way-manifold, IEC 61518, material: 1.4404 (316L), packing: PTFE, screws M10
A71U	5-way-manifold, IEC 61518, material: 1.4404 (316L), packing: PTFE, screws 7/16-UNF
Y999	Special design
12. Special design/pre-assembly:	
0	without
M01	mounting of dp transmitter (customer provision)
M03	mounting of p transmitter (customer provision) with oval flange, mat. st.st.
A4	cleaned from oil+grease certificate
A5	oxygen service certificate
A6	PWIS free certificate (PWIS = paint-wetting impairment substances)
SPA	1/8" NPTF cleaning ports + plug
Y99	Special design

D3) Order Data for IBR-35/36

ITABAR®-FLOW-SENSOR for Liquids and Gases, threaded connection.	
Code	Description
1. Type:	
IBR-35	Sensor Ø42mm prepared for cutting ring process connection (max. PN40) for liquids and gases without end support
IBR-36	Sensor Ø42mm prepared for cutting ring process connection (max. PN40) for liquids and gases with end support
2. Pipe (duct) size: (ID/WT):	
DN200	DN 200 / 8"
DN250	DN 250 / 10"
DN300	DN 300 / 12"
DN350	DN 350 / 14"
DN400	DN 400 / 16"
DN450	DN 450 / 18"
DN500	DN 500 / 20"
DN600	DN 600 / 24"
DN700	DN 700 / 28"
DN800	DN 800 / 32"
DN900	DN 900 / 36"
DN1000	DN 1000 / 40"
DN1100	DN 1100 / 44"
DN1200	DN 1200 / 48"
DN1400	DN 1400 / 56"
DN1600	DN 1600 / 64"
DN1800	DN 1800 / 72"
DN2000	DN 2000 / 80"
Y9	others, please specify
3. Material sensor:	
S	1.4404 / 316L
V	1.4571 / 316Ti
Y	Special design
4. Welding coupling:	
000	without
001	material: C22.8 (similar A105)
002	material: 1.4404 / 316L
003	material: 1.4571 / 316Ti
031	material: C22.8 (similar A105) with saddle plate, material: 1.4571/1.4301
041	material: C22.8 (similar A105) with saddle plate, mat.: 1.4571/1.4301 w. rubber gasket
032	material: 1.4404 / 316L with saddle plate, material: 1.4571/1.4301
042	material: 1.4404 / 316L with saddle plate, material: 1.4571/1.4301 w. rubber gasket
033	material: 1.4571 / 316Ti with saddle plate, material: 1.4571/1.4301
043	material: 1.4571 / 316Ti with saddle plate, material: 1.4571/1.4301 w. rubber gasket
Y9	Special design

Please see next page

Itabar-Flow-Sensors

IBR-35/36 continuation	
Code	Description
5. End support:	
00	without
01	material: C22.8 (similar A105)
02	material: 1.4404 / 316L
03	material: 1.4571 / 316Ti
11	material: C22.8 (similar A105) with saddle plate, material: 1.4571/1.4301
21	material: C22.8 (similar A105) with saddle plate, mat.: 1.4571/1.4301 w. rubber gasket
12	material: 1.4404 / 316L with saddle plate, material: 1.4571/1.4301
22	material: 1.4404 / 316L with saddle plate, material: 1.4571/1.4301 w. rubber gasket
13	material: 1.4571 / 316Ti with saddle plate, material: 1.4571/1.4301
23	material: 1.4571 / 316Ti with saddle plate, material: 1.4571/1.4301 w. rubber gasket
Y9	Special design
6. Pipe insulation:	
KI	without
X	insulation in mm (min. 50mm)
Y	Special design
7. Pipe run / flow direction:	
HL	horizontal, left
HR	horizontal, right
VD	vertical, down
VU	vertical, upwards
Y9	Special design
8. Integrated temperature sensor:	
T0	without
TA	3-wire, RTD -50 bis 400°C, without Ex approval, Sensor diameter=Ø3,0mm
TB	3-wire, RTD -50 bis 400°C, Ex approval, Sensor diameter=Ø3,0mm
TC	thermocouple type K with INT5334-A3B non-ex-version; 4...20 mA output
TX	sensor prepared for PT100, probe diameter = Ø3,0mm (customer provision)
Y	Special design
8.1 Head transmitter for integrated RTD:	
0	without
2	4...20 mA / without Ex approval
3	4...20 mA + HART / without Ex approval
4	Profibus PA / without Ex approval
5	Foundation Fieldbus / without Ex approval
6	4...20 mA / ATEX Ex ia
7	4...20 mA + HART / ATEX Ex ia
8	Profibus PA / ATEX Ex ia
9	Foundation Fieldbus / ATEX Ex ia
Y	Special design

Please see next page

IBR-35/36 continuation	
Code	Description
9. Differential pressure connection:	
A03	1 pair of nozzles, MNPT1/2" (remote version)
A03A03	2 pair of nozzles, MNPT1/2" (remote version)
A03A03A03	3 pair of nozzles, MNPT1/2" (remote version)
A04	1 pair of nozzles, MNPT1/4" (remote version)
A04A04	2 pair of nozzles, MNPT1/4" (remote version)
A04G	1 pair of nozzles, R1/4" male thread (remote version)
A04GA04G	2 pair of nozzles, R1/4" male thread (remote version)
A04S	1 pair of tube nozzle Ø6x4x1 (remote version)
R12	1 pair of pipe Ø12x1,5x50mm, material: 1.4571 (316Ti)
A12	1 pair Weld-on fitting Ermeto 12S, material: 316SS (remote version)
AS2	1 pair welding connection Ø21.3x3,2mm - welding end (remote version)
AS3	1 pair welding connection Ø21.3x6,3mm - welding end (remote version)
AS4	1 pair welding connection Ø24x4,0mm - welding end (remote version)
A06	IEC 61518; PTFE gasket
A16	IEC 61518; Viton gasket
A26	IEC 61518; PTFE gasket, cranked (for integrated temperature sensor or humid gas)
A36	IEC 61518; Viton gasket, cranked (for integrated temperature sensor or humid gas)
Y99	Special design
10. Shut-off valve for remote version (initial shut-off):	
A00	without
A54G	1 pair ball valve PN40, mat.: CF8M (1.4408), female R1/4", packing: PTFE
A54GA54G	2 pair ball valve PN40, mat.: CF8M (1.4408), female R1/4", packing: PTFE
A56	1 pair ball valve PN40, mat.: CF8M (1.4408), female 1/2" NPT, packing: PTFE
A56A56	2 pair ball valve PN40, mat.: CF8M (1.4408), female 1/2" NPT, packing: PTFE
A56A56A56	3 pair ball valve PN40, mat.: CF8M (1.4408), female 1/2" NPT, packing: PTFE
A62	1 pair valve, PN400, housing: SS316/316L, female 1/2" NPT, packing: Graphite
A62A62	2 pair valve, PN400, housing: SS316/316L, female 1/2" NPT, packing: Graphite
A62A62A62	3 pair valve, PN400, housing: SS316/316L, female 1/2" NPT, packing: Graphite
A81	1 pair gate valve 800lbs. housing: A105, female 1/2" NPT, packing: Graphite
A82	1 pair gate valve 800lbs. housing: 316SS, female 1/2" NPT, packing: Graphite
AV1	1 pair valve, PN400, housing: C22.8 (A105), Ø21,3x6,3/Ø14,0x2,5 , packing: Graphite
AV2	1 pair valve, PN400, hsg: 1.4571 (316Ti), Ø21,3x6,3/Ø14,0x2,5 , packing: Graphite
AV3	valve, PN400, housing: 1.5415 (16Mo3), Ø21,3x6,3/Ø14,0x2,5 , packing: Graphite
Y99	Special design
10.1 First Shut-off accessories:	
0	without
E12	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø12mm, mat.: 316SS
E14	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø14mm, mat.: 316SS
Y99	Special design
10.2 Manifold for remote variant:	
0	without
A65P	3-way-manifold, 316/316L, PN420 DN5, In/Out: 1/2"-NPTF/IEC61518-A, packing: PTFE
A70P	5-way-manifold, 316/316L PN420 DN5, In/Out: 1/2"-NPTF/IEC61518-A, packing: PTFE
Y99	Special design
10.2.1 Mounting set for remote version (manifold):	
0	without
MBC	mounting set, CS zinc-plated, for 2" pipe mtg, incl. screws 7/16-UNF/ FPM90-O-Ring
MBS	mounting set, stainless steel, for 2" pipe mounting, incl. screws 7/16-UNF/ FPM90-O-Ring
Y99	Special design

Please see next page

Itabar-Flow-Sensors

IBR-35/36 continuation	
Code	Description
10.2.2 Accessories for manifold:	
0	Without
E12	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø12mm, mat.: 316SS
E14	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø14mm, mat.: 316SS
Y99	Special design
11. Valve block for compact variant:	
A000	without
A66M	3-way-manifold, IEC 61518, material: 1.4404 (316L), packing: PTFE, screws M10
A66U	3-way-manifold, IEC 61518, material: 1.4404 (316L), packing: PTFE, screws 7/16-UNF
A71M	5-way-manifold, IEC 61518, material: 1.4404 (316L), packing: PTFE, screws M10
A71U	5-way-manifold, IEC 61518, material: 1.4404 (316L), packing: PTFE, screws 7/16-UNF
Y999	Special design
12. Special design/pre-assembly:	
0	without
M01	mounting of dp transmitter (customer provision)
M03	mounting of p transmitter (customer provision) with oval flange, mat. st.st.
A4	cleaned from oil+grease certificate
A5	oxygen service certificate
A6	PWIS free certificate (PWIS = paint-wetting impairment substances)
SPA	1/8" NPTF cleaning ports + plug
Y99	Special design

IB

B.2 Itabar for Liquids and Gases (fixed installation)

IBF

B.2.2 Itabar with flanged process connection

Types: IBF-20/21/25/26/35/36/65/66 (up to 5801 psi)

a.) Description:

The ITABAR-sensor series IBF is designed to measure the volumetric flow of liquids and gases. The sensor flange is threaded to a pipe mount welding boss, which makes the use in max 5801 psi applications possible. The maximum pressure is a function of the flange rating.

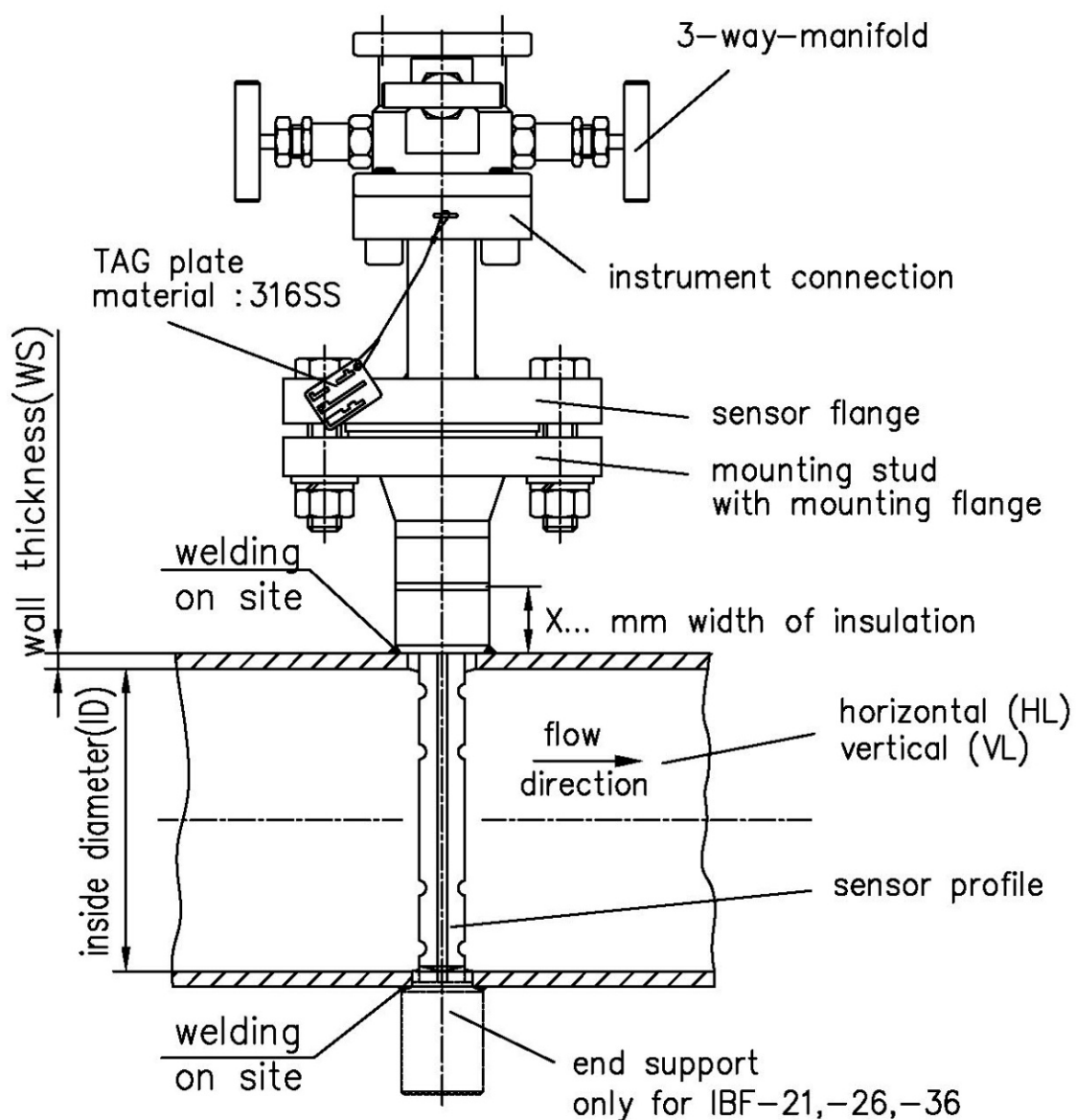
The standard sensor material is 316 SS; the following materials are optional alternatives: 1.4462 (Duplex), 1.4539, Hastelloy C4, Incoloy 800, Inconel, Monel.



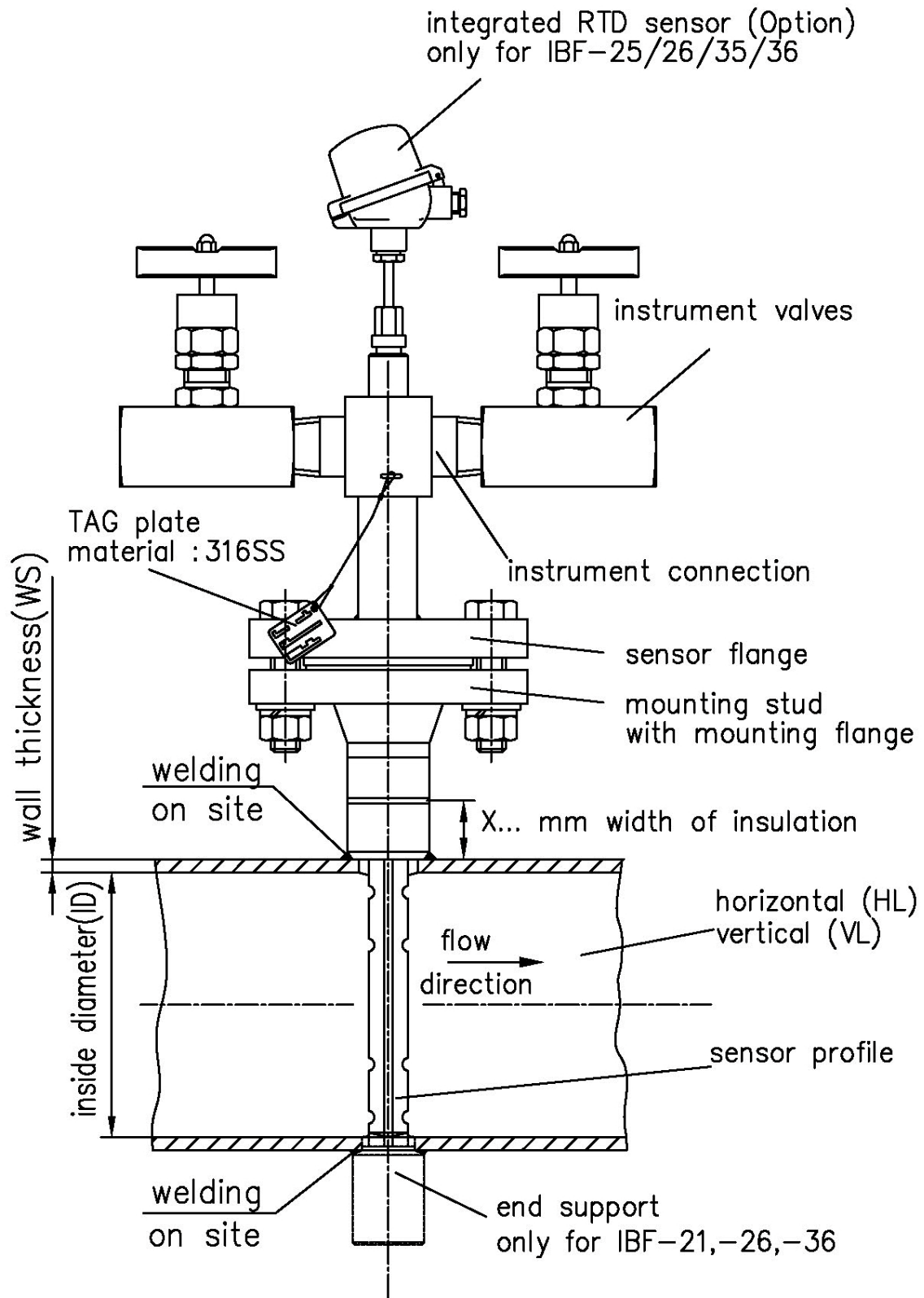
Itabar-Flow-Sensors

b.) Drawings for IBF

compact version electr. d.p.transmitter mounted onto the flow sensor (only with A06)



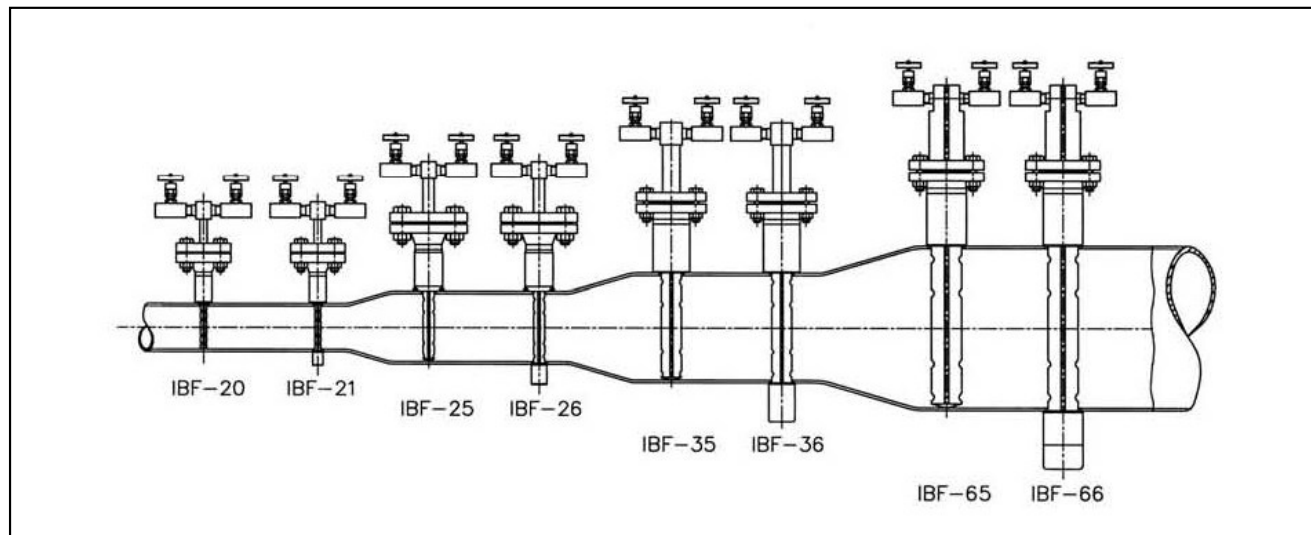
separate installation of sensor and transmitter



Itabar-Flow-Sensors

c.) Order Data for IBF-20/21/25/26/35/36/65/66

c.1) Sensor type:



Pipe Size Inches mm		Max. allowable volume flow m³/h Sensor Type							
		IBF - 20	IBF -21	IBF -25	IBF -26	IBF -35	IBF -36	IBF -65	IBF -66
1 ½	DN 40	29	114	---	---	---	---	---	---
2	DN 50	59	161	---	---	---	---	---	---
2 ¼	DN 65	95	243	---	---	---	---	---	---
2 ½	DN 80	130	328	---	---	---	---	---	---
4	DN 100	179	439	205	544	---	---	---	---
5	DN 125	238	570	281	719	---	---	---	---
6	DN 150	---	---	358	894	---	---	---	---
8	DN 200	---	---	61	1242	---	---	---	---
10	DN 250	---	---	687	1623	---	---	---	---
12	DN 300	---	---	872	2034	1757	4204	2818	---
14	DN 350	---	---	1053	2433	2142	5067	3481	---
16	DN 400	---	---	1226	2818	2532	5942	4138	---
20	DN 500	---	---	1592	3627	3283	7611	5344	12233
24	DN 600	---	---	1949	4420	4052	9327	6794	15455
28	DN 700	---	---	2318	5237	4846	11106	8263	18723
32	DN 800	---	---	2701	6099	7937	12930	9665	21727
36	DN 900	---	---	---	7000	---	14790	---	24501
40	DN 1000	---	---	---	7921	---	16674	---	27182
48	DN 1200	---	---	---	9763	---	20450	---	32876
56	DN 1400	---	---	---	11569	---	24400	---	39177
64	DN 1600	---	---	---	13315	---	27987	---	46015
72	DN 1800	---	---	---	15040	---	31613	---	52029
80	DN 2000	---	---	---	---	---	35239	---	57999

These values are for water of $\rho = 0,9982 \text{ kg/l}$ SGU and at a temperature $T = 20 \text{ }^{\circ}\text{C}$. To calculate volumetric or mass flow of fluids with other densities see chapter 6 „Specifications of DP Sensors with WINFLOW“.

d) Order Specifications for Itabar-Flow-Sensors, Series IBF

d1) Order Data for IBF-20/21

ITABAR®-FLOW-SENSOR for Liquids and Gases, flanged connection.	
Code	Description
1. Type:	
IBF-20	Sensor Ø12mm prepared for flanged process connection; for liquids and gases without endsupport
IBF-21	Sensor Ø12mm prepared for flanged process connection; for liquids and gases with endsupport
2. Pipe (duct) size: (ID/WT):	
DN040	DN 40 / 1-1/2"
DN050	DN 50 / 2"
DN065	DN 65 / 2-1/2"
DN080	DN 80 / 3"
DN100	DN 100 / 4"
Y9	others, please specify
3. Material sensor:	
S	1.4404 / 316L
V	1.4571 / 316Ti
X	1.4462 / ASTM F51 / Duplex
K	1.4539 / AISI 904L
N	1.4841 / AISI 314
M	2.4360 / Alloy 400 / N04400
H	2.4610 / Alloy C4 / N06455
I	2.4858 / Alloy 825 / N08825
T	3.7035 / Titan Grade 2
Y	others, please specify
4. Process connection:	
00	without
FA	flanged connection
Y	others, please specify
4.1 standard:	
E	EN 1092-1
A	ASME B 16.5
D	DIN (according to type & pressure rating)
Y	others, please specify
4.2 nominal size:	
A23	DN25
AGG	1"
Y9	others, please specify

Please see next page

Itabar-Flow-Sensors

IBF-20/21 continuation	
Code	Description
4.3 Pressure class:	
C	PN16
D	PN40
E	PN63
F	PN100
G	PN160
H	PN250
I	PN320
J	PN400
K	150 lbs.
L	300 lbs.
M	600 lbs.
N	900 lbs.
O	1500 lbs.
P	2500 lbs.
Y	others, please specify
4.4 Flange face process connetion flange:	
E0	EN 1092-1 Form A (without sealing strip; Ra 3.2-12.5µm)
E1	EN 1092-1 Form B1 (raised sealing strip; Ra 3,2-12,5µm)
E2	EN 1092-1 Form B2 (raised sealing strip; Ra 0,8-3,2µm)
E3	EN 1092-1 Form C (tongue; Ra 0,8-3,2µm)
E4	EN 1092-1 Form D (groove; Ra 0,8-3,2µm)
A1	ASME B 16.5 Raised Face (RF)
A2	ASME B 16.5 Raised Face Smooth Finish (RFSF)
A3	ASME B 16.5 Flat Face (FF)
A4	ASME B 16.5 Ring-Type Joint (RTJ)
A5	ASME B 16.5 Tongue (ASME)
A6	ASME B 16.5 Groove (ASME)
D1	DIN Form A (without special demand)
D2	DIN Form B (raised sealing strip ; Rz = 160µm)
D3	DIN Form C (raised sealing strip ; Rz = 160µm)
D4	DIN Form D (raised sealing strip ; Rz = 40µm)
D5	DIN Form E (raised sealing strip ; Rz = 16µm)
D6	DIN Form F (tongue acc. DIN 2512)
D7	DIN Form N (groove acc. DIN 2512)
Y9	others, please specify
4.5 Gasket:	
0	without
A	material: PTFE, thickness: 2 mm, max. 150°C (302°F)
B	Fibre-reinforced flat gasket; Klingersil C4400, thickness: 2 mm; max. 200°C (392°F)
C	Spiral wound gasket w/ IR(316)&AR(CS) filling graphite; thickn.: 4. mm; max. 450°C (842°F)
D	Sp.wnd gasket w/ IR(316SS)&AR(316SS) filling graphite; thickn.: 4.5mm; max.450°C (842°F)
RO	Ring-Joint Seal Type R-Oval ASME B16.20
Y9	others, please specify

Please see next page

IBF-20/21 continuation	
Code	Description
4.6 Bolts/nuts	
0	without
1	DIN931 (ISO 4014) hex-head screw with one nut; material: 5.6/5.2 (carbon steel zinc-plated)
2	DIN931 (ISO 4014) hex-head screw with one nut; material: A2-70 (stainless steel)
3	DIN 2510 Form L Material: 1.1181 / CK35
4	DIN 2510 Form L Material: 1.4301 / A2-70
5	ASME B16.5 Material: A193 Gr. B7 / A194 Gr. 2H (galvanised)
6	ASME B16.5 Material: A193 Gr. B8 Cl.1 / A194 Gr. 8
Y9	others, please specify
5. Design mounting stud	
0	without (provided by others / customer /)
R	mounting stud with flange (standard)
W0	weldolet assembly, stud with flange
Y9	others, please specify
5.1 Material mounting stud	
C	P250GH / A105
S	1.4404 / 316L
V	1.4571 / 316Ti
X	1.4462 / ASTM F51 / Duplex
K	1.4539 / AISI 904L
N	1.4841 / AISI 314
M	2.4360 / Alloy 400 / N04400
H	2.4610 / Alloy C4 / N06455
I	2.4858 / Alloy 825 / N08825
T	3.7035 / Titan Grade 2
Y9	others, please specify
5.2 standard:	
E	EN 1092-1
A	ASME B 16.5
D	DIN (according to type & pressure rating)
Y	others, please specify
5.3 nominal size:	
A23	DN25
AGG	1"
Y9	others, please specify

Please see next page

Itabar-Flow-Sensors

IBF-20/21 continuation	
Code	Description
5.4 pressure class	
C	PN16
D	PN40
E	PN63
F	PN100
G	PN160
H	PN250
I	PN320
J	PN400
K	150 lbs.
L	300 lbs.
M	600 lbs.
N	900 lbs.
O	1500 lbs.
P	2500 lbs.
Y9	others, please specify
5.5 Flange face mounting stud flange:	
E0	EN 1092-1 Form A (without sealing strip; Ra 3.2-12.5µm)
E1	EN 1092-1 Form B1 (raised sealing strip; Ra 3,2-12,5µm)
E2	EN 1092-1 Form B2 (raised sealing strip; Ra 0,8-3,2µm)
E3	EN 1092-1 Form C (tongue; Ra 0,8-3,2µm)
E4	EN 1092-1 Form D (groove; Ra 0,8-3,2µm)
A1	ASME B 16.5 Raised Face (RF)
A2	ASME B 16.5 Raised Face Smooth Finish (RFSF)
A3	ASME B 16.5 Flat Face (FF)
A4	ASME B 16.5 Ring-Type Joint (RTJ)
A5	ASME B 16.5 Tongue (ASME)
A6	ASME B 16.5 Groove (ASME)
D1	DIN Form A (without special demand)
D2	DIN Form B (raised sealing strip ; Rz = 160µm)
D3	DIN Form C (raised sealing strip ; Rz = 160µm)
D4	DIN Form D (raised sealing strip ; Rz = 40µm)
D5	DIN Form E (raised sealing strip ; Rz = 16µm)
D6	DIN Form F (tongue acc. DIN 2512)
D7	DIN Form N (groove acc. DIN 2512)
Y9	others, please specify

Please see next page

IBF-20/21 continuation	
Code	Description
6. End support	
0	without
C	material: C22.8 (similar A105)
S	material: 1.4404 / 316L
V	material: 1.4571 / 316Ti
X	material: 1.4462 / ASTM F51 / Duplex
K	material: 1.4539 / AISI 904L
N	material: 1.4841 / AISI 314
M	material: 2.4360 / Alloy 400 / N04400
H	material: 2.4610 / Alloy C4 / N06455
I	material: 2.4858 / Alloy 825 / N08825
T	material: 3.7035 / Titan Grade 2
Y	others, please specify
7. Pipe insulation	
KI	without
X	insulation in mm (min. 50mm)
Y	others, please specify
8. Pipe run/flow direction	
HL	horizontal, left
HR	horizontal, right
VD	vertical, down
VU	vertical, upwards
Y9	others, please specify
9. Integrated temperature sensor:	
T0	without
TA	3-wire, RTD -50 bis 400°C, without Ex approval, Sensor diameter=Ø0.5mm
TB	3-wire, RTD -50 bis 400°C, Ex approval, Sensor diameter=Ø0.5mm
TC	thermocouple type K with INT5334-A3B non-ex-version; 4...20 mA output
TX	sensor prepared for PT100, probe diameter = Ø0.5mm (customer provision)
Y	others, please specify
9.1 Head transmitter for integrated temperature sensor:	
0	without
2	4...20 mA / without Ex approval
3	4...20 mA + HART / without Ex approval
4	Profibus PA / without Ex approval
5	Foundation Fieldbus / without Ex approval
6	4...20 mA / ATEX Ex ia
7	4...20 mA + HART / ATEX Ex ia
8	Profibus PA / ATEX Ex ia
9	Foundation Fieldbus / ATEX Ex ia
Y	others, please specify

Please see next page

Itabar-Flow-Sensors

IBF-20/21 continuation	
Code	Description
10. Differential pressure connection:	
A03	1 pair of nozzles, MNPT 1/2" (remote version)
A03A03	2 pair of nozzles, MNPT 1/2" (remote version)
A03A03A03	3 pair of nozzles, MNPT 1/2" (remote version)
A04	1 pair of nozzles, MNPT 1/4" (remote version)
A04A04	2 pair of nozzles, MNPT 1/4" (remote version)
A04G	1 pair of nozzles, R1/4" male thread (remote version)
A04GA04G	2 pair of nozzles, R1/4" male thread (remote version)
A04S	1 pair of tube nozzle Ø6x4x1 (remote version)
R12	1 pair of pipe Ø12x1,5x50mm, material: 1.4571 (316Ti)
A12	1 pair Weld-on fitting Ermeto 12S, material: 316SS (remote version)
AS2	1 pair welding connection Ø21.3x3,2mm - welding end (remote version)
AS3	1 pair welding connection Ø21.3x6,3mm - welding end (remote version)
AS4	1 pair welding connection Ø24x4,0mm - welding end (remote version)
A06	IEC 61518; PTFE gasket
A16	IEC 61518; Viton gasket
A26	IEC 61518; PTFE gasket, cranked (for integrated temperature sensor or humid gas)
A36	IEC 61518; Viton gasket, cranked (for integrated temperature sensor or humid gas)
Y99	others, please specify
11. Shut-off valve for remote version (initial shut-off):	
A00	without
A54G	1 pair ball valve PN40, mat.: CF8M (1.4408), female R1/4", packing: PTFE
A54GA54G	2 pair ball valve PN40, mat.: CF8M (1.4408), female R1/4", packing: PTFE
A56	1 pair ball valve PN40, mat.: CF8M (1.4408), female 1/2" NPT, packing: PTFE
A56A56	2 pair ball valve PN40, mat.: CF8M (1.4408), female 1/2" NPT, packing: PTFE
A56A56A56	3 pair ball valve PN40, mat.: CF8M (1.4408), female 1/2" NPT, packing: PTFE
A62	1 pair valve, PN400, housing: SS316/316L, female 1/2" NPT, packing: Graphite
A62A62	2 pair valve, PN400, housing: SS316/316L, female 1/2" NPT, packing: Graphite
A62A62A62	3 pair valve, PN400, housing: SS316/316L, female 1/2" NPT, packing: Graphite
A81	1 pair gate valve 800lbs. housing: A105, female 1/2" NPT, packing: Graphite
A82	1 pair gate valve 800lbs. housing: 316SS, female 1/2" NPT, packing: Graphite
AV1	1 pair valve, PN400, housing: C22.8 (A105), Ø21,3x6,3/Ø14,0x2,5 , packing: Graphite
AV2	1 pair valve, PN400, hsg: 1.4571 (316Ti), Ø21,3x6,3/Ø14,0x2,5 , packing: Graphite
AV3	valve, PN400, housing: 1.5415 (16Mo3), Ø21,3x6,3/Ø14,0x2,5 , packing: Graphite
Y99	others, please specify
11.1 First Shut-off accessories:	
0	without
E12	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø12mm, mat.: 316SS
E14	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø14mm, mat.: 316SS
Y99	others, please specify
11.2 Manifold for remote version:	
0	without
A65P	3-way-manifold, 316/316L, PN420 DN5, In/Out: 1/2"-NPTF/IEC61518-A, pckg: PTFE
A70P	5-way-manifold, 316/316L PN420 DN5, In/Out: 1/2"-NPTF/IEC61518-A, pckg: PTFE
Y99	others, please specify

Please see next page

IBF-20/21 continuation	
Code	Description
11.2.1 Mounting set for remote version (manifold):	
0	without
MBC	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø12mm, mat.: 316SS
MBS	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø14mm, mat.: 316SS
Y99	others, please specify
11.2.2 Accessories for manifold:	
0	without
E12	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø12mm, mat.: 316SS
E14	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø14mm, mat.: 316SS
Y99	others, please specify
12. Manifold for compact version:	
A000	without
A66M	3-way-manifold, IEC 61518, mat.: 1.4404 (316L), packing: PTFE, screws M10
A66U	3-way-manifold, IEC 61518, mat.: 1.4404 (316L), packing: PTFE, screws 7/16-UNF
A71M	5-way-manifold, IEC 61518, mat.: 1.4404 (316L), packing: PTFE, screws M10
A71U	5-way-manifold, IEC 61518, mat.: 1.4404 (316L), packing: PTFE, screws 7/16-UNF
Y999#	others, please specify
13. Special design/pre-assembly:	
0	without
M01	mounting of dp transmitter (customer provision)
M03	mounting of p transmitter (customer provision) with oval flange, mat. st.st.
A4	cleaned from oil+grease certificate
A5	oxygen service certificate
A6	PWIS free certificate (PWIS = paint-wetting impairment substances)
Y99	others, please specify

Itabar-Flow-Sensors

D2) Order Data for IBF-25/26

ITABAR®-FLOW-SENSOR for Liquids and Gases, flanged connection.	
Code	Description
1. Type:	
IBF-25	Sensor Ø25,4mm prepared for flanged process connection; for liquids and gases without end support
IBF-26	Sensor Ø25,4mm prepared for flanged process connection; for liquids and gases with end support
2. Pipe (duct) size: (ID/WT):	
DN100	DN 100 / 4"
DN125	DN 125 / 5"
DN150	DN 150 / 6"
DN200	DN 200 / 8"
DN250	DN 250 / 10"
DN300	DN 300 / 12"
DN350	DN 350 / 14"
DN400	DN 400 / 16"
DN450	DN 450 / 18"
DN500	DN 500 / 20"
DN600	DN 600 / 24"
DN700	DN 700 / 28"
DN800	DN 800 / 32"
DN900	DN 900 / 36"
DN1000	DN 1000 / 40"
DN1100	DN 1100 / 44"
DN1200	DN 1200 / 48"
DN1400	DN 1400 / 56"
DN1600	DN 1600 / 64"
DN1800	DN 1800 / 72"
DN2000	DN 2000 / 80"
Y9	others, please specify
3. Material sensor:	
S	1.4404 / 316L
V	1.4571 / 316Ti
X	1.4462 / ASTM F51 / Duplex
K	1.4539 / AISI 904L
N	1.4841 / AISI 314
M	2.4360 / Alloy 400 / N04400
H	2.4610 / Alloy C4 / N06455
I	2.4858 / Alloy 825 / N08825
D	PVDF
E	PTFE
L	PTFE, Conductive Carbon
T	3.7035 / Titan Grade 2
Y	others, please specify
4. Process connection:	
00	without
FA	flanged connection
Y	others, please specify

Please see next page

IBF-25/26 continuation	
Code	Description
4.1 standard:	
E	EN 1092-1
A	ASME B 16.5
D	DIN (according to type & pressure rating)
Y	others, please specify
4.2 nominal size:	
32	DN32
40	DN40
12	1-1/2"
Y99	others, please specify
4.3 Pressure class:	
C	PN16
D	PN40
E	PN63
F	PN100
G	PN160
H	PN250
I	PN320
J	PN400
K	150 lbs.
L	300 lbs.
M	600 lbs.
N	900 lbs.
O	1500 lbs.
P	2500 lbs.
Y9	others, please specify
4.4 Flange face process connection flange:	
E0	EN 1092-1 Form A (without sealing strip; Ra 3.2-12.5µm)
E1	EN 1092-1 Form B1 (raised sealing strip; Ra 3,2-12,5µm)
E2	EN 1092-1 Form B2 (raised sealing strip; Ra 0,8-3,2µm)
E3	EN 1092-1 Form C (tongue; Ra 0,8-3,2µm)
E4	EN 1092-1 Form D (groove; Ra 0,8-3,2µm)
A1	ASME B 16.5 Raised Face (RF)
A2	ASME B 16.5 Raised Face Smooth Finish (RFSF)
A3	ASME B 16.5 Flat Face (FF)
A4	ASME B 16.5 Ring-Type Joint (RTJ)
A5	ASME B 16.5 Tongue (ASME)
A6	ASME B 16.5 Groove (ASME)
D1	DIN Form A (without special demand)
D2	DIN Form B (raised sealing strip ; Rz = 160µm)
D3	DIN Form C (raised sealing strip ; Rz = 160µm)
D4	DIN Form D (raised sealing strip ; Rz = 40µm)
D5	DIN Form E (raised sealing strip ; Rz = 16µm)
D6	DIN Form F (tongue acc. DIN 2512)
D7	DIN Form N (groove acc. DIN 2512)
Y9#	others, please specify

Please see next page

Itabar-Flow-Sensors

IBF-25/26 continuation	
Code	Description
4.5 Gasket	
0	without
A	material: PTFE, thickness: 2 mm, max. 150°C (302°F)
B	Fibre-reinforced flat gasket; Klingersil C4400, thickness: 2 mm; max. 200°C (392°F)
C	Sp. wnd gasket w/ IR(316)&AR(CS) filling graphite; thickn.: 4.5 mm; max. 450°C (842°F)
D	Sp. wnd gasket w/IR(316SS)&AR(316SS) filling graphite;thickn.:4.5mm;max.450°C (842°F)
RO	Ring-Joint Seal Type R-Oval ASME B16.20
Y9	others, please specify
4.6 Bolts / nuts:	
0	without
1	DIN931 (ISO 4014) hex-head screw with one nut; material: 5.6/5.2 (carbon steel zinc-plated)
2	DIN931 (ISO 4014) hex-head screw with one nut; material: A2-70 (stainless steel)
3	DIN 2510 Form L Material: 1.1181 / CK35
4	DIN 2510 Form L Material: 1.4301 / A2-70
5	ASME B16.5 Material: A193 Gr. B7 / A194 Gr. 2H (galvanised)
6	ASME B16.5 Material: A193 Gr. B8 Cl.1 / A194 Gr. 8
Y9	others, please specify
5. Design mounting part:	
0	without (provided by others / customer /)
R	mounting stud with flange (standard)
W0	weldolet assembly, stud with flange
Y9	others, please specify
5.1 Material mounting stud:	
C	P250GH / A105
S	1.4404 / 316L
V	1.4571 / 316Ti
X	1.4462 / ASTM F51 / Duplex
K	1.4539 / AISI 904L
N	1.4841 / AISI 314
M	2.4360 / Alloy 400 / N04400
H	2.4610 / Alloy C4 / N06455
I	2.4858 / Alloy 825 / N08825
T	3.7035 / Titan Grade 2
D	PVDF
Y	others, please specify
5.2 standard:	
E	EN 1092-1
A	ASME B 16.5
D	DIN (according to type & pressure rating)
Y	others, please specify
5.3 nominal size:	
32	DN32
40	DN40
12	1-1/2"
Y9	others, please specify

Please see next page

IBF-25/26 continuation	
Code	Description
5.4 Pressure class:	
C	PN16
D	PN40
E	PN63
F	PN100
G	PN160
H	PN250
I	PN320
J	PN400
K	150 lbs.
L	300 lbs.
M	600 lbs.
N	900 lbs.
O	1500 lbs.
P	2500 lbs.
Y9	others, please specify
5.5 Flange face mounting stud flange:	
E0	EN 1092-1 Form A (without sealing strip; Ra 3.2-12.5µm)
E1	EN 1092-1 Form B1 (raised sealing strip; Ra 3,2-12,5µm)
E2	EN 1092-1 Form B2 (raised sealing strip; Ra 0,8-3,2µm)
E3	EN 1092-1 Form C (tongue; Ra 0,8-3,2µm)
E4	EN 1092-1 Form D (groove; Ra 0,8-3,2µm)
A1	ASME B 16.5 Raised Face (RF)
A2	ASME B 16.5 Raised Face Smooth Finish (RFSF)
A3	ASME B 16.5 Flat Face (FF)
A4	ASME B 16.5 Ring-Type Joint (RTJ)
A5	ASME B 16.5 Tongue (ASME)
A6	ASME B 16.5 Groove (ASME)
D1	DIN Form A (without special demand)
D2	DIN Form B (raised sealing strip ; Rz = 160µm)
D3	DIN Form C (raised sealing strip ; Rz = 160µm)
D4	DIN Form D (raised sealing strip ; Rz = 40µm)
D5	DIN Form E (raised sealing strip ; Rz = 16µm)
D6	DIN Form F (tongue acc. DIN 2512)
D7	DIN Form N (groove acc. DIN 2512)
Y9	others, please specify

Please see next page

Itabar-Flow-Sensors

IBF-25/26 continuation	
Code	Description
6. End support:	
0	without
C	material: C22.8 (similar A105)
S	material: 1.4404 / 316L
V	material: 1.4571 / 316Ti
X	material: 1.4462 / ASTM F51 / Duplex
K	material: 1.4539 / AISI 904L
N	material: 1.4841 / AISI 314
M	material: 2.4360 / Alloy 400 / N04400
H	material: 2.4610 / Alloy C4 / N06455
I	material: 2.4858 / Alloy 825 / N08825
T	material: 3.7035 / Titan Grade 2
D	material: PVDF
Y	others, please specify
7. Pipe insulation:	
KI	without
X	insulation in mm (min. 50mm)
Y	others, please specify
8. Pipe run/flow direction:	
HL	horizontal, left
HR	horizontal, right
VD	vertical, down
VU	vertical, upwards
Y9	others, please specify
9. Integrated temperature sensor	
T0	without
TA	3-wire, RTD -50 bis 400°C, without Ex approval, Sensor diameter=Ø3,0mm
TB	3-wire, RTD -50 bis 400°C, Ex approval, Sensor diameter=Ø3,0mm
TC	thermocouple type K with INT5334-A3B non-ex-version; 4...20 mA output
TX	sensor prepared for PT100, probe diameter = Ø3,0mm (customer provision)
Y	others, please specify
9.1 Head transmitter for integrated temperature sensor	
0	without
2	4...20 mA / without Ex approval
3	4...20 mA + HART / without Ex approval
4	Profibus PA / without Ex approval
5	Foundation Fieldbus / without Ex approval
6	4...20 mA / ATEX Ex ia
7	4...20 mA + HART / ATEX Ex ia
8	Profibus PA / ATEX Ex ia
9	Foundation Fieldbus / ATEX Ex ia
Y	others, please specify

Please see next page

IBF-25/26 continuation	
Code	Description
10. Differential pressure connection:	
A03	1 pair of nozzles, MNPT1/2" (remote version)
A03A03	2 pair of nozzles, MNPT1/2" (remote version)
A03A03A03	3 pair of nozzles, MNPT1/2" (remote version)
A04	1 pair of nozzles, MNPT1/4" (remote version)
A04A04	2 pair of nozzles, MNPT1/4" (remote version)
A04G	1 pair of nozzles, R1/4" male thread (remote version)
A04GA04G	2 pair of nozzles, R1/4" male thread (remote version)
A04S	1 pair of tube nozzle Ø6x4x1 (remote version)
R12	1 pair of pipe Ø12x1,5x50mm, material: 1.4571 (316Ti)
A12	1 pair Weld-on fitting Ermeto 12S, material: 316SS (remote version)
AS2	1 pair welding connection Ø21.3x3,2mm - welding end (remote version)
AS3	1 pair welding connection Ø21.3x6,3mm - welding end (remote version)
AS4	1 pair welding connection Ø24x4,0mm - welding end (remote version)
A06	IEC 61518; PTFE gasket
A16	IEC 61518; Viton gasket
A26	IEC 61518; PTFE gasket, cranked (for integrated temperature sensor or humid gas)
A36	IEC 61518; Viton gasket, cranked (for integrated temperature sensor or humid gas)
Y99	others, please specify
11. Shut-off valve for remote version (initial shut-off):	
A00	without
A54G	1 pair ball valve PN40, mat.: CF8M (1.4408), female R1/4", packing: PTFE
A54GA54G	2 pair ball valve PN40, mat.: CF8M (1.4408), female R1/4", packing: PTFE
A56	1 pair ball valve PN40, mat.: CF8M (1.4408), female 1/2" NPT, packing: PTFE
A56A56	2 pair ball valve PN40, mat.: CF8M (1.4408), female 1/2" NPT, packing: PTFE
A56A56A56	3 pair ball valve PN40, mat.: CF8M (1.4408), female 1/2" NPT, packing: PTFE
A62	1 pair valve, PN400, housing: SS316/316L, female 1/2" NPT, packing: Graphite
A62A62	2 pair valve, PN400, housing: SS316/316L, female 1/2" NPT, packing: Graphite
A62A62A62	3 pair valve, PN400, housing: SS316/316L, female 1/2" NPT, packing: Graphite
A81	1 pair gate valve 800lbs. housing: A105, female 1/2" NPT, packing: Graphite
A82	1 pair gate valve 800lbs. housing: 316SS, female 1/2" NPT, packing: Graphite
AV1	1 pair valve, PN400, housing: C22.8 (A105), Ø21,3x6,3/Ø14,0x2,5 , packing: Graphite
AV2	1 pair valve, PN400, hsg: 1.4571 (316Ti), Ø21,3x6,3/Ø14,0x2,5 , packing: Graphite
AV3	valve, PN400, housing: 1.5415 (16Mo3), Ø21,3x6,3/Ø14,0x2,5 , packing: Graphite
Y99	others, please specify
11.1 First shut-off accessories:	
0	without
E12	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø12mm, mat.: 316SS
E14	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø14mm, mat.: 316SS
Y99	others, please specify
11.2 Manifold for remote version:	
0	without
A65P	3-way-manifold, 316/316L, PN420 DN5, In/Out: 1/2"-NPTF/IEC61518-A, pckng: PTFE
A70P	5-way-manifold, 316/316L PN420 DN5, In/Out: 1/2"-NPTF/IEC61518-A, pckng: PTFE
Y99	others, please specify

Please see next page

Itabar-Flow-Sensors

IBF-25/26 continuation	
Code	Description
11.2.1 Mounting set for remote version (manifold):	
0	without
MBC	mounting set, CS zinc-plated, for 2" pipe mounting, incl. screws 7/16-UNF/ FPM90-O-Ring
MBS	mounting set, stainless steel, for 2" pipe mounting, incl. screws 7/16-UNF/ FPM90-O-Ring
Y99	others, please specify
11.2.2 Accessories for manifold:	
0	without
E12	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø12mm, mat.: 316SS
E14	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø14mm, mat.: 316SS
Y99	others, please specify
12. Valve block for compact version:	
A000	without
A66M	3-way-manifold, IEC 61518, material: 1.4404 (316L), packing: PTFE, screws M10
A66U	3-way-manifold, IEC 61518, material: 1.4404 (316L), packing: PTFE, screws 7/16-UNF
A71M	5-way-manifold, IEC 61518, material: 1.4404 (316L), packing: PTFE, screws M10
A71U	5-way-manifold, IEC 61518, material: 1.4404 (316L), packing: PTFE, screws 7/16-UNF
Y999	others, please specify
13. Special design/pre-assembly:	
0	without
M01	mounting of dp transmitter (customer provision)
M03	mounting of p transmitter (customer provision) with oval flange, mat. st.st.
A4	cleaned from oil+grease certificate
A5	oxygen service certificate
A6	PWIS free certificate (PWIS = paint-wetting impairment substances)
Y99	others, please specify

D3) Order Data for IBF-35/36

ITABAR®-FLOW-SENSOR for Liquids and Gases, flanged connection.	
Code	Description
1. Type:	
IBF-35	Sensor Ø42mm prepared for flanged process connection; for liquids and gases without end support
IBF-36	Sensor Ø42mm prepared for flanged process connection; for liquids and gases with end support
2. Pipe (duct) size: (ID/WT):	
DN300	DN 300 / 12"
DN350	DN 350 / 14"
DN400	DN 400 / 16"
DN450	DN 450 / 18"
DN500	DN 500 / 20"
DN600	DN 600 / 24"
DN700	DN 700 / 28"
DN800	DN 800 / 32"
DN900	DN 900 / 36"
DN1000	DN 1000 / 40"
DN1100	DN 1100 / 44"
DN1200	DN 1200 / 48"
DN1400	DN 1400 / 56"
DN1600	DN 1600 / 64"
DN1800	DN 1800 / 72"
DN2000	DN 2000 / 80"
Y9	others, please specify
3. Material sensor:	
S	1.4404 / 316L
V	1.4571 / 316Ti
X	1.4462 / ASTM F51 / Duplex
K	1.4539 / AISI 904L
N	1.4841 / AISI 314
M	2.4360 / Alloy 400 / N04400
H	2.4610 / Alloy C4 / N06455
I	2.4858 / Alloy 825 / N08825
D	PVDF
E	PTFE
L	PTFE, Conductive Carbon
T	3.7035 / Titan Grade 2
Y	others, please specify
4. Process connection:	
00	without
FA	flanged connection
Y	others, please specify

Please see next page

Itabar-Flow-Sensors

IBF-35/36 continuation	
Code	Description
4.1 standard:	
E	EN 1092-1
A	ASME B 16.5
D	DIN (according to type & pressure rating)
Y	others, please specify
4.2 nominal size:	
50	DN50
20	2"
Y99	others, please specify
4.3 Pressure class:	
C	PN16
D	PN40
E	PN63
F	PN100
G	PN160
H	PN250
I	PN320
J	PN400
K	150 lbs.
L	300 lbs.
M	600 lbs.
N	900 lbs.
O	1500 lbs.
P	2500 lbs.
Y9	others, please specify
4.4 Flange face process connection flange:	
E0	EN 1092-1 Form A (without sealing strip; Ra 3.2-12.5µm)
E1	EN 1092-1 Form B1 (raised sealing strip; Ra 3,2-12,5µm)
E2	EN 1092-1 Form B2 (raised sealing strip; Ra 0,8-3,2µm)
E3	EN 1092-1 Form C (tongue; Ra 0,8-3,2µm)
E4	EN 1092-1 Form D (groove; Ra 0,8-3,2µm)
A1	ASME B 16.5 Raised Face (RF)
A2	ASME B 16.5 Raised Face Smooth Finish (RFSF)
A3	ASME B 16.5 Flat Face (FF)
A4	ASME B 16.5 Ring-Type Joint (RTJ)
A5	ASME B 16.5 Tongue (ASME)
A6	ASME B 16.5 Groove (ASME)
D1	DIN Form A (without special demand)
D2	DIN Form B (raised sealing strip ; Rz = 160µm)
D3	DIN Form C (raised sealing strip ; Rz = 160µm)
D4	DIN Form D (raised sealing strip ; Rz = 40µm)
D5	DIN Form E (raised sealing strip ; Rz = 16µm)
D6	DIN Form F (tongue acc. DIN 2512)
D7	DIN Form N (groove acc. DIN 2512)
Y9#	others, please specify

Please see next page

IBF-35/36 continuation	
Code	Description
4.5 Gasket	
0	without
A	material: PTFE, thickness: 2 mm, max. 150°C (302°F)
B	Fibre-reinforced flat gasket; Klingersil C4400, thickness: 2 mm; max. 200°C (392°F)
C	Sp. wnd gasket w/ IR(316)&AR(CS) filling graphite; thickn.: 4.5 mm; max. 450°C (842°F)
D	Sp. wnd gasket w/IR(316SS)&AR(316SS) filling graphite;thickn.:4.5mm;max.450°C (842°F)
RO	Ring-Joint Seal Type R-Oval ASME B16.20
Y9	others, please specify
4.6 Bolts / nuts:	
0	without
1	DIN931 (ISO 4014) hex-head screw with one nut; material: 5.6/5.2 (carbon steel zinc-plated)
2	DIN931 (ISO 4014) hex-head screw with one nut; material: A2-70 (stainless steel)
3	DIN 2510 Form L Material: 1.1181 / CK35
4	DIN 2510 Form L Material: 1.4301 / A2-70
5	ASME B16.5 Material: A193 Gr. B7 / A194 Gr. 2H (galvanised)
6	ASME B16.5 Material: A193 Gr. B8 Cl.1 / A194 Gr. 8
Y9	others, please specify
5. Design mounting part:	
0	without (provided by others / customer /)
R	mounting stud with flange (standard)
W0	weldolet assembly, stud with flange
Y9	others, please specify
5.1 Material mounting stud:	
C	P250GH / A105
S	1.4404 / 316L
V	1.4571 / 316Ti
X	1.4462 / ASTM F51 / Duplex
K	1.4539 / AISI 904L
N	1.4841 / AISI 314
M	2.4360 / Alloy 400 / N04400
H	2.4610 / Alloy C4 / N06455
I	2.4858 / Alloy 825 / N08825
T	3.7035 / Titan Grade 2
D	PVDF
Y	others, please specify
5.2 standard:	
E	EN 1092-1
A	ASME B 16.5
D	DIN (according to type & pressure rating)
Y	others, please specify
5.3 nominal size:	
50	DN50
20	2"
Y9	others, please specify

Please see next page

Itabar-Flow-Sensors

IBF-35/36 continuation	
Code	Description
5.4 Pressure class:	
C	PN16
D	PN40
E	PN63
F	PN100
G	PN160
H	PN250
I	PN320
J	PN400
K	150 lbs.
L	300 lbs.
M	600 lbs.
N	900 lbs.
O	1500 lbs.
P	2500 lbs.
Y9	others, please specify
5.5 Flange face mounting stud flange:	
E0	EN 1092-1 Form A (without sealing strip; Ra 3.2-12.5µm)
E1	EN 1092-1 Form B1 (raised sealing strip; Ra 3,2-12,5µm)
E2	EN 1092-1 Form B2 (raised sealing strip; Ra 0,8-3,2µm)
E3	EN 1092-1 Form C (tongue; Ra 0,8-3,2µm)
E4	EN 1092-1 Form D (groove; Ra 0,8-3,2µm)
A1	ASME B 16.5 Raised Face (RF)
A2	ASME B 16.5 Raised Face Smooth Finish (RFSF)
A3	ASME B 16.5 Flat Face (FF)
A4	ASME B 16.5 Ring-Type Joint (RTJ)
A5	ASME B 16.5 Tongue (ASME)
A6	ASME B 16.5 Groove (ASME)
D1	DIN Form A (without special demand)
D2	DIN Form B (raised sealing strip ; Rz = 160µm)
D3	DIN Form C (raised sealing strip ; Rz = 160µm)
D4	DIN Form D (raised sealing strip ; Rz = 40µm)
D5	DIN Form E (raised sealing strip ; Rz = 16µm)
D6	DIN Form F (tongue acc. DIN 2512)
D7	DIN Form N (groove acc. DIN 2512)
Y9	others, please specify

Please see next page

IBF-35/36 continuation	
Code	Description
6. End support:	
0	without
C	material: C22.8 (similar A105)
S	material: 1.4404 / 316L
V	material: 1.4571 / 316Ti
X	material: 1.4462 / ASTM F51 / Duplex
K	material: 1.4539 / AISI 904L
N	material: 1.4841 / AISI 314
M	material: 2.4360 / Alloy 400 / N04400
H	material: 2.4610 / Alloy C4 / N06455
I	material: 2.4858 / Alloy 825 / N08825
T	material: 3.7035 / Titan Grade 2
D	material: PVDF
Y	others, please specify
7. Pipe insulation:	
KI	without
X	insulation in mm (min. 50mm)
Y	others, please specify
8. Pipe run/flow direction:	
HL	horizontal, left
HR	horizontal, right
VD	vertical, down
VU	vertical, upwards
Y9	others, please specify
9. Integrated temperature sensor	
T0	without
TA	3-wire, RTD -50 bis 400°C, without Ex approval, Sensor diameter=Ø3,0mm
TB	3-wire, RTD -50 bis 400°C, Ex approval, Sensor diameter=Ø3,0mm
TC	thermocouple type K with INT5334-A3B non-ex-version; 4...20 mA output
TX	sensor prepared for PT100, probe diameter = Ø3,0mm (customer provision)
Y	others, please specify
9.1 Head transmitter for integrated temperature sensor	
0	without
2	4...20 mA / without Ex approval
3	4...20 mA + HART / without Ex approval
4	Profibus PA / without Ex approval
5	Foundation Fieldbus / without Ex approval
6	4...20 mA / ATEX Ex ia
7	4...20 mA + HART / ATEX Ex ia
8	Profibus PA / ATEX Ex ia
9	Foundation Fieldbus / ATEX Ex ia
Y	others, please specify

Please see next page

Itabar-Flow-Sensors

IBF-35/36 continuation	
Code	Description
10. Differential pressure connection:	
A03	1 pair of nozzles, MNPT1/2" (remote version)
A03A03	2 pair of nozzles, MNPT1/2" (remote version)
A03A03A03	3 pair of nozzles, MNPT1/2" (remote version)
A04	1 pair of nozzles, MNPT1/4" (remote version)
A04A04	2 pair of nozzles, MNPT1/4" (remote version)
A04G	1 pair of nozzles, R1/4" male thread (remote version)
A04GA04G	2 pair of nozzles, R1/4" male thread (remote version)
A04S	1 pair of tube nozzle Ø6x4x1 (remote version)
R12	1 pair of pipe Ø12x1,5x50mm, material: 1.4571 (316Ti)
A12	1 pair Weld-on fitting Ermeto 12S, material: 316SS (remote version)
AS2	1 pair welding connection Ø21.3x3,2mm - welding end (remote version)
AS3	1 pair welding connection Ø21.3x6,3mm - welding end (remote version)
AS4	1 pair welding connection Ø24x4,0mm - welding end (remote version)
A06	IEC 61518; PTFE gasket
A16	IEC 61518; Viton gasket
A26	IEC 61518; PTFE gasket, cranked (for integrated temperature sensor or humid gas)
A36	IEC 61518; Viton gasket, cranked (for integrated temperature sensor or humid gas)
Y99	others, please specify
11. Shut-off valve for remote version (initial shut-off):	
A00	without
A54G	1 pair ball valve PN40, mat.: CF8M (1.4408), female R1/4", packing: PTFE
A54GA54G	2 pair ball valve PN40, mat.: CF8M (1.4408), female R1/4", packing: PTFE
A56	1 pair ball valve PN40, mat.: CF8M (1.4408), female 1/2" NPT, packing: PTFE
A56A56	2 pair ball valve PN40, mat.: CF8M (1.4408), female 1/2" NPT, packing: PTFE
A56A56A56	3 pair ball valve PN40, mat.: CF8M (1.4408), female 1/2" NPT, packing: PTFE
A62	1 pair valve, PN400, housing: SS316/316L, female 1/2" NPT, packing: Graphite
A62A62	2 pair valve, PN400, housing: SS316/316L, female 1/2" NPT, packing: Graphite
A62A62A62	3 pair valve, PN400, housing: SS316/316L, female 1/2" NPT, packing: Graphite
A81	1 pair gate valve 800lbs. housing: A105, female 1/2" NPT, packing: Graphite
A82	1 pair gate valve 800lbs. housing: 316SS, female 1/2" NPT, packing: Graphite
AV1	1 pair valve, PN400, housing: C22.8 (A105), Ø21,3x6,3/Ø14,0x2,5 , packing: Graphite
AV2	1 pair valve, PN400, hsg: 1.4571 (316Ti), Ø21,3x6,3/Ø14,0x2,5 , packing: Graphite
AV3	valve, PN400, housing: 1.5415 (16Mo3), Ø21,3x6,3/Ø14,0x2,5 , packing: Graphite
Y99	others, please specify
11.1 First shut-off accessories:	
0	without
E12	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø12mm, mat.: 316SS
E14	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø14mm, mat.: 316SS
Y99	others, please specify
11.2 Manifold for remote version:	
0	without
A65P	3-way-manifold, 316/316L, PN420 DN5, In/Out: 1/2"-NPTF/IEC61518-A, pckng: PTFE
A70P	5-way-manifold, 316/316L PN420 DN5, In/Out: 1/2"-NPTF/IEC61518-A, pckng: PTFE
Y99	others, please specify

Please see next page

IBF-35/36 continuation	
Code	Description
11.2.1 Mounting set for remote version (manifold):	
0	without
MBC	mounting set, CS zinc-plated, for 2" pipe mounting, incl. screws 7/16-UNF/ FPM90-O-Ring
MBS	mounting set, stainless steel, for 2" pipe mounting, incl. screws 7/16-UNF/ FPM90-O-Ring
Y99	others, please specify
11.2.2 Accessories for manifold:	
0	without
E12	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø12mm, mat.: 316SS
E14	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø14mm, mat.: 316SS
Y99	others, please specify
12. Valve block for compact version:	
A000	without
A66M	3-way-manifold, IEC 61518, material: 1.4404 (316L), packing: PTFE, screws M10
A66U	3-way-manifold, IEC 61518, material: 1.4404 (316L), packing: PTFE, screws 7/16-UNF
A71M	5-way-manifold, IEC 61518, material: 1.4404 (316L), packing: PTFE, screws M10
A71U	5-way-manifold, IEC 61518, material: 1.4404 (316L), packing: PTFE, screws 7/16-UNF
Y999	others, please specify
13. Special design/pre-assembly:	
0	without
M01	mounting of dp transmitter (customer provision)
M03	mounting of p transmitter (customer provision) with oval flange, mat. st.st.
A4	cleaned from oil+grease certificate
A5	oxygen service certificate
A6	PWIS free certificate (PWIS = paint-wetting impairment substances)
Y99	others, please specify

Itabar-Flow-Sensors

D4) Order Data for IBF-65/66

ITABAR®-FLOW-SENSOR for Liquids and Gases, flanged connection.	
Code	Description
1. Type:	
IBF-65	Sensor Ø56mm prepared for flanged process connection; for liquids and gases without end support
IBF-66	Sensor Ø56mm prepared for flanged process connection; for liquids and gases with end support
2. Pipe (duct) size: (ID/WT):	
DN300	DN 300 / 12"
DN350	DN 350 / 14"
DN400	DN 400 / 16"
DN450	DN 450 / 18"
DN500	DN 500 / 20"
DN600	DN 600 / 24"
DN700	DN 700 / 28"
DN800	DN 800 / 32"
DN900	DN 900 / 36"
DN1000	DN 1000 / 40"
DN1100	DN 1100 / 44"
DN1200	DN 1200 / 48"
DN1400	DN 1400 / 56"
DN1600	DN 1600 / 64"
DN1800	DN 1800 / 72"
DN2000	DN 2000 / 80"
Y9	others, please specify
3. Material sensor:	
S	1.4404 / 316L
V	1.4571 / 316Ti
X	1.4462 / ASTM F51 / Duplex
K	1.4539 / AISI 904L
N	1.4841 / AISI 314
M	2.4360 / Alloy 400 / N04400
H	2.4610 / Alloy C4 / N06455
I	2.4858 / Alloy 825 / N08825
D	PVDF
T	3.7035 / Titan Grade 2
Y	others, please specify
4. Process connection:	
00	Without
FA	flanged connection
Y	others, please specify

Please see next page

IBF-65/66 continuation	
Code	Description
4.1 standard:	
E	EN 1092-1
A	ASME B 16.5
D	DIN (according to type & pressure rating)
Y	others, please specify
4.2 nominal size:	
80	DN80
30	3"
Y99	others, please specify
4.3 Pressure class:	
C	PN16
D	PN40
E	PN63
F	PN100
G	PN160
H	PN250
I	PN320
J	PN400
K	150 lbs.
L	300 lbs.
M	600 lbs.
N	900 lbs.
O	1500 lbs.
P	2500 lbs.
Y9	others, please specify
4.4 Flange face process connection flange:	
E0	EN 1092-1 Form A (without sealing strip; Ra 3.2-12.5µm)
E1	EN 1092-1 Form B1 (raised sealing strip; Ra 3,2-12,5µm)
E2	EN 1092-1 Form B2 (raised sealing strip; Ra 0,8-3,2µm)
E3	EN 1092-1 Form C (tongue; Ra 0,8-3,2µm)
E4	EN 1092-1 Form D (groove; Ra 0,8-3,2µm)
A1	ASME B 16.5 Raised Face (RF)
A2	ASME B 16.5 Raised Face Smooth Finish (RFSF)
A3	ASME B 16.5 Flat Face (FF)
A4	ASME B 16.5 Ring-Type Joint (RTJ)
A5	ASME B 16.5 Tongue (ASME)
A6	ASME B 16.5 Groove (ASME)
D1	DIN Form A (without special demand)
D2	DIN Form B (raised sealing strip ; Rz = 160µm)
D3	DIN Form C (raised sealing strip ; Rz = 160µm)
D4	DIN Form D (raised sealing strip ; Rz = 40µm)
D5	DIN Form E (raised sealing strip ; Rz = 16µm)
D6	DIN Form F (tongue acc. DIN 2512)
D7	DIN Form N (groove acc. DIN 2512)
Y9#	others, please specify

Please see next page

Itabar-Flow-Sensors

IBF-65/66 continuation	
Code	Description
4.5 Gasket	
0	without
A	material: PTFE, thickness: 2 mm, max. 150°C (302°F)
B	Fibre-reinforced flat gasket; Klingersil C4400, thickness: 2 mm; max. 200°C (392°F)
C	Sp. wnd gasket w/ IR(316)&AR(CS) filling graphite; thickn.: 4.5 mm; max. 450°C (842°F)
D	Sp. wnd gasket w/IR(316SS)&AR(316SS) filling graphite;thickn.:4.5mm;max.450°C (842°F)
RO	Ring-Joint Seal Type R-Oval ASME B16.20
Y9	others, please specify
4.6 Bolts / nuts:	
0	without
1	DIN931 (ISO 4014) hex-head screw with one nut; material: 5.6/5.2 (carbon steel zinc-plated)
2	DIN931 (ISO 4014) hex-head screw with one nut; material: A2-70 (stainless steel)
3	DIN 2510 Form L Material: 1.1181 / CK35
4	DIN 2510 Form L Material: 1.4301 / A2-70
5	ASME B16.5 Material: A193 Gr. B7 / A194 Gr. 2H (galvanised)
6	ASME B16.5 Material: A193 Gr. B8 Cl.1 / A194 Gr. 8
Y9	others, please specify
5. Design mounting part:	
0	without (provided by others / customer /)
R	mounting stud with flange (standard)
W0	weldolet assembly, stud with flange
Y9	others, please specify
5.1 Material mounting stud:	
C	P250GH / A105
S	1.4404 / 316L
V	1.4571 / 316Ti
X	1.4462 / ASTM F51 / Duplex
K	1.4539 / AISI 904L
N	1.4841 / AISI 314
M	2.4360 / Alloy 400 / N04400
H	2.4610 / Alloy C4 / N06455
I	2.4858 / Alloy 825 / N08825
T	3.7035 / Titan Grade 2
D	PVDF
Y	others, please specify
5.2 standard:	
E	EN 1092-1
A	ASME B 16.5
D	DIN (according to type & pressure rating)
Y	others, please specify
5.3 nominal size:	
80	DN80
30	3"
Y9	others, please specify

Please see next page

IBF-65/66 continuation	
Code	Description
5.4 Pressure class:	
C	PN16
D	PN40
E	PN63
F	PN100
G	PN160
H	PN250
I	PN320
J	PN400
K	150 lbs.
L	300 lbs.
M	600 lbs.
N	900 lbs.
O	1500 lbs.
P	2500 lbs.
Y9	others, please specify
5.5 Flange face mounting stud flange:	
E0	EN 1092-1 Form A (without sealing strip; Ra 3.2-12.5µm)
E1	EN 1092-1 Form B1 (raised sealing strip; Ra 3,2-12,5µm)
E2	EN 1092-1 Form B2 (raised sealing strip; Ra 0,8-3,2µm)
E3	EN 1092-1 Form C (tongue; Ra 0,8-3,2µm)
E4	EN 1092-1 Form D (groove; Ra 0,8-3,2µm)
A1	ASME B 16.5 Raised Face (RF)
A2	ASME B 16.5 Raised Face Smooth Finish (RFSF)
A3	ASME B 16.5 Flat Face (FF)
A4	ASME B 16.5 Ring-Type Joint (RTJ)
A5	ASME B 16.5 Tongue (ASME)
A6	ASME B 16.5 Groove (ASME)
D1	DIN Form A (without special demand)
D2	DIN Form B (raised sealing strip ; Rz = 160µm)
D3	DIN Form C (raised sealing strip ; Rz = 160µm)
D4	DIN Form D (raised sealing strip ; Rz = 40µm)
D5	DIN Form E (raised sealing strip ; Rz = 16µm)
D6	DIN Form F (tongue acc. DIN 2512)
D7	DIN Form N (groove acc. DIN 2512)
Y9	others, please specify

Please see next page

Itabar-Flow-Sensors

IBF-65/66 continuation	
Code	Description
6. End support:	
0	without
C	material: C22.8 (similar A105)
S	material: 1.4404 / 316L
V	material: 1.4571 / 316Ti
X	material: 1.4462 / ASTM F51 / Duplex
K	material: 1.4539 / AISI 904L
N	material: 1.4841 / AISI 314
M	material: 2.4360 / Alloy 400 / N04400
H	material: 2.4610 / Alloy C4 / N06455
I	material: 2.4858 / Alloy 825 / N08825
T	material: 3.7035 / Titan Grade 2
D	material: PVDF
Y	others, please specify
7. Pipe insulation:	
KI	without
X	insulation in mm (min. 50mm)
Y	others, please specify
8. Pipe run/flow direction:	
HL	horizontal, left
HR	horizontal, right
VD	vertical, down
VU	vertical, upwards
Y9	others, please specify
9. Integrated temperature sensor	
T0	without
TA	3-wire, RTD -50 bis 400°C, without Ex approval, Sensor diameter=Ø3,0mm
TB	3-wire, RTD -50 bis 400°C, Ex approval, Sensor diameter=Ø3,0mm
TC	thermocouple type K with INT5334-A3B non-ex-version; 4...20 mA output
TX	sensor prepared for PT100, probe diameter = Ø3,0mm (customer provision)
Y	others, please specify
9.1 Head transmitter for integrated temperature sensor	
0	without
2	4...20 mA / without Ex approval
3	4...20 mA + HART / without Ex approval
4	Profibus PA / without Ex approval
5	Foundation Fieldbus / without Ex approval
6	4...20 mA / ATEX Ex ia
7	4...20 mA + HART / ATEX Ex ia
8	Profibus PA / ATEX Ex ia
9	Foundation Fieldbus / ATEX Ex ia
Y	others, please specify

Please see next page

IBF-65/66 continuation	
Code	Description
10. Differential pressure connection:	
A03	1 pair of nozzles, MNPT1/2" (remote version)
A03A03	2 pair of nozzles, MNPT1/2" (remote version)
A03A03A03	3 pair of nozzles, MNPT1/2" (remote version)
A04	1 pair of nozzles, MNPT1/4" (remote version)
A04A04	2 pair of nozzles, MNPT1/4" (remote version)
A04G	1 pair of nozzles, R1/4" male thread (remote version)
A04GA04G	2 pair of nozzles, R1/4" male thread (remote version)
A04S	1 pair of tube nozzle Ø6x4x1 (remote version)
R12	1 pair of pipe Ø12x1,5x50mm, material: 1.4571 (316Ti)
A12	1 pair Weld-on fitting Ermeto 12S, material: 316SS (remote version)
AS2	1 pair welding connection Ø21.3x3,2mm - welding end (remote version)
AS3	1 pair welding connection Ø21.3x6,3mm - welding end (remote version)
AS4	1 pair welding connection Ø24x4,0mm - welding end (remote version)
A06	IEC 61518; PTFE gasket
A16	IEC 61518; Viton gasket
A26	IEC 61518; PTFE gasket, cranked (for integrated temperature sensor or humid gas)
A36	IEC 61518; Viton gasket, cranked (for integrated temperature sensor or humid gas)
Y99	others, please specify
11. Shut-off valve for remote version (initial shut-off):	
A00	without
A54G	1 pair ball valve PN40, mat.: CF8M (1.4408), female R1/4", packing: PTFE
A54GA54G	2 pair ball valve PN40, mat.: CF8M (1.4408), female R1/4", packing: PTFE
A56	1 pair ball valve PN40, mat.: CF8M (1.4408), female 1/2" NPT, packing: PTFE
A56A56	2 pair ball valve PN40, mat.: CF8M (1.4408), female 1/2" NPT, packing: PTFE
A56A56A56	3 pair ball valve PN40, mat.: CF8M (1.4408), female 1/2" NPT, packing: PTFE
A62	1 pair valve, PN400, housing: SS316/316L, female 1/2" NPT, packing: Graphite
A62A62	2 pair valve, PN400, housing: SS316/316L, female 1/2" NPT, packing: Graphite
A62A62A62	3 pair valve, PN400, housing: SS316/316L, female 1/2" NPT, packing: Graphite
A81	1 pair gate valve 800lbs. housing: A105, female 1/2" NPT, packing: Graphite
A82	1 pair gate valve 800lbs. housing: 316SS, female 1/2" NPT, packing: Graphite
AV1	1 pair valve, PN400, housing: C22.8 (A105), Ø21,3x6,3/Ø14,0x2,5 , packing: Graphite
AV2	1 pair valve, PN400, hsg: 1.4571 (316Ti), Ø21,3x6,3/Ø14,0x2,5 , packing: Graphite
AV3	valve, PN400, housing: 1.5415 (16Mo3), Ø21,3x6,3/Ø14,0x2,5 , packing: Graphite
Y99	others, please specify
11.1 First shut-off accessories:	
0	without
E12	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø12mm, mat.: 316SS
E14	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø14mm, mat.: 316SS
Y99	others, please specify
11.2 Manifold for remote version:	
0	without
A65P	3-way-manifold, 316/316L, PN420 DN5, In/Out: 1/2"-NPTF/IEC61518-A, pckng: PTFE
A70P	5-way-manifold, 316/316L PN420 DN5, In/Out: 1/2"-NPTF/IEC61518-A, pckng: PTFE
Y99	others, please specify

Please see next page

Itabar-Flow-Sensors

IBF-65/66 continuation	
Code	Description
11.2.1 Mounting set for remote version (manifold):	
0	without
MBC	mounting set, CS zinc-plated, for 2" pipe mounting, incl. screws 7/16-UNF/ FPM90-O-Ring
MBS	mounting set, stainless steel, for 2" pipe mounting, incl. screws 7/16-UNF/ FPM90-O-Ring
Y99	others, please specify
11.2.2 Accessories for manifold:	
0	without
E12	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø12mm, mat.: 316SS
E14	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø14mm, mat.: 316SS
Y99	others, please specify
12. Valve block for compact version:	
A000	without
A66M	3-way-manifold, IEC 61518, material: 1.4404 (316L), packing: PTFE, screws M10
A66U	3-way-manifold, IEC 61518, material: 1.4404 (316L), packing: PTFE, screws 7/16-UNF
A71M	5-way-manifold, IEC 61518, material: 1.4404 (316L), packing: PTFE, screws M10
A71U	5-way-manifold, IEC 61518, material: 1.4404 (316L), packing: PTFE, screws 7/16-UNF
Y999	others, please specify
13. Special design/pre-assembly:	
0	without
M01	mounting of dp transmitter (customer provision)
M03	mounting of p transmitter (customer provision) with oval flange, mat. st.st.
A4	cleaned from oil+grease certificate
A5	oxygen service certificate
A6	PWIS free certificate (PWIS = paint-wetting impairment substances)
Y99	others, please specify

IBF-100

B.2.2 Itabar for Flue Gas Applications

Type: IBF-100 (up to 232 psi [16 bar])

a.) Description:

The ITABAR-sensor IBF-100 is specially designed to measure volumetric flow of flue gas.

In this model the two pressure chambers within the sensor are enlarged. The reasons are as follows:

- 1) The frequency of cleaning requirements is reduced.
- 2) Cleaning by mechanical means or with air pressure is made easy.

The design allows cleaning of the pressure chambers via the sensor's pipe mounting assembly as well as from its flanged end support. For cleaning purposes the two parallel pressure chambers have a round shape which runs over the entire length of the sensor.

The standard sensor material is 316 SS; the following materials are options: 1.4539, Hastelloy C4, Incoloy und PVDF.

For automatic cleaning the LSP air-purge unit is available.

The flue gas sensor IBF-100 is approved for (German) governmentally ordered volumetric flow measurements of water saturated emissions (TA Luft 1986, 13. BimSchV and 17. BimSchV).

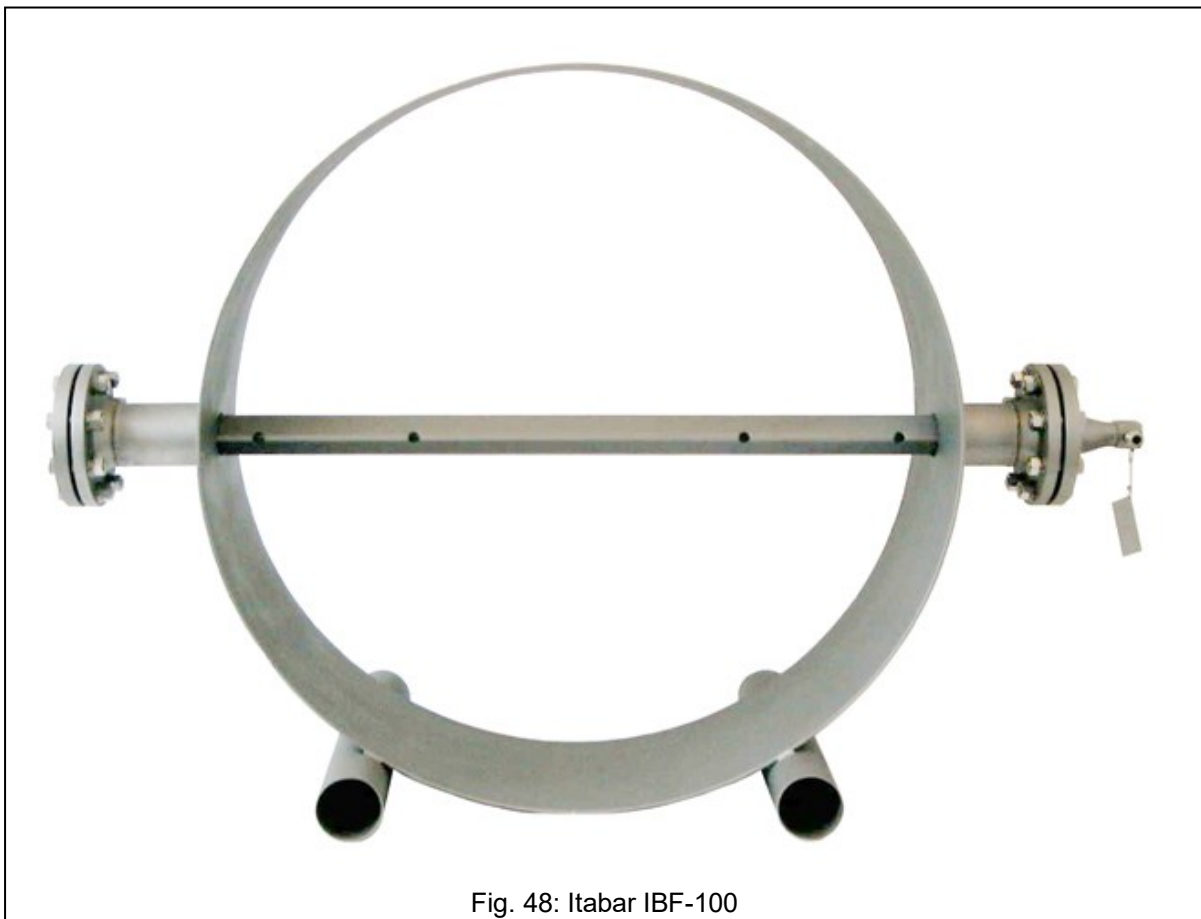
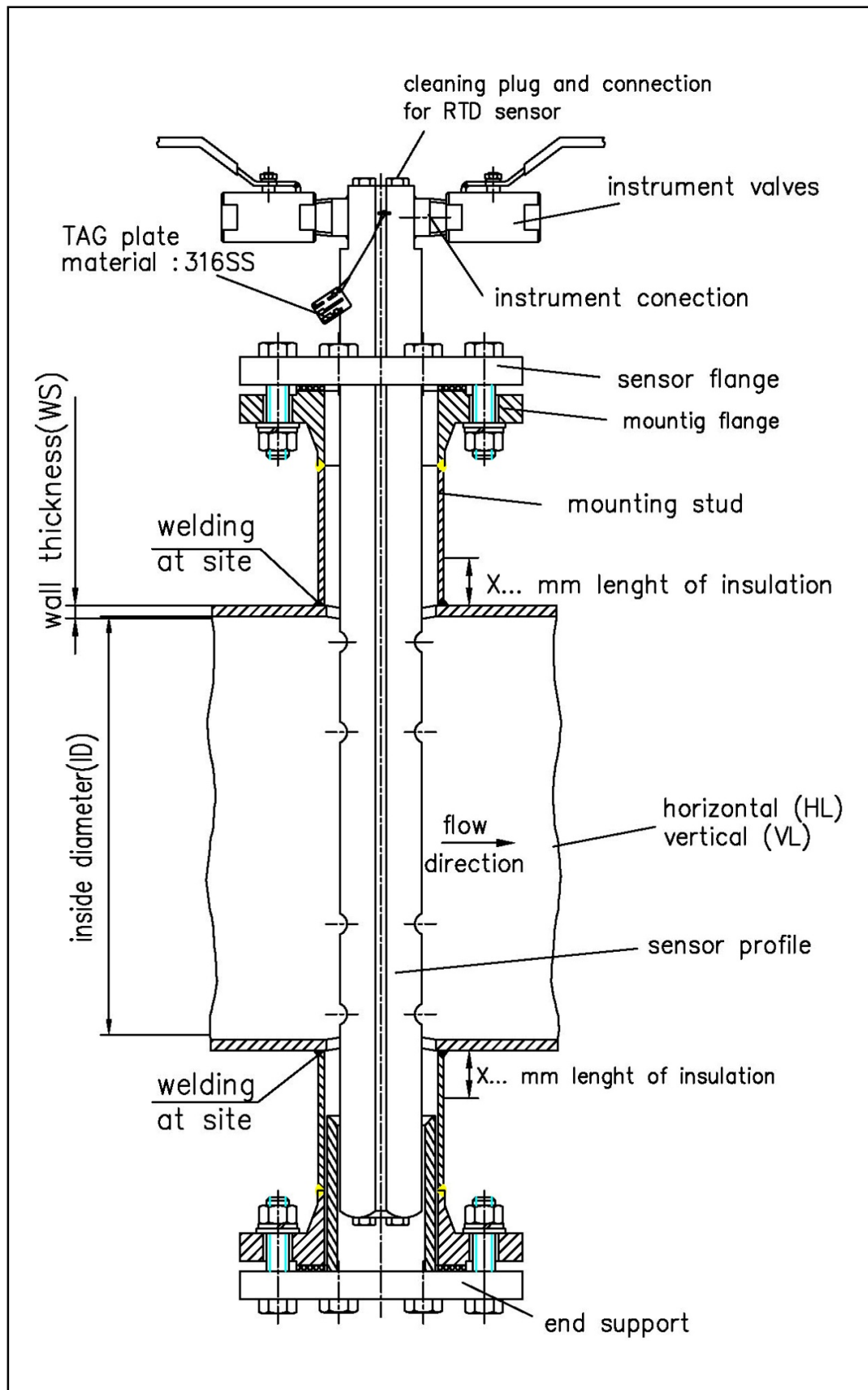


Fig. 48: Itabar IBF-100

Itabar-Flow-Sensors

b) Drawing for IBF-100



c.) Order Specifications for Itabar-Flow-Sensors, Series IBF-100

ITABAR®-FLOW-SENSOR for Liquids and Gases, flanged connection.	
Code	Description
1. Type:	
IBF-100	Sensor Ø56mm prepared for flanged process connection; for liquids and gases with flanged end support
2. Pipe (duct) size: (ID/WT):	
DN300	DN 300 / 12"
DN350	DN 350 / 14"
DN400	DN 400 / 16"
DN450	DN 450 / 18"
DN500	DN 500 / 20"
DN600	DN 600 / 24"
DN700	DN 700 / 28"
DN800	DN 800 / 32"
DN900	DN 900 / 36"
DN1000	DN 1000 / 40"
DN1100	DN 1100 / 44"
DN1200	DN 1200 / 48"
DN1400	DN 1400 / 56"
DN1600	DN 1600 / 64"
DN1800	DN 1800 / 72"
DN2000	DN 2000 / 80"
Y9	others, please specify
3. Material sensor:	
S	1.4404 / 316L
V	1.4571 / 316Ti
K	1.4539 / AISI 904L
M	2.4360 / Alloy 400 / N04400
H	2.4610 / Alloy C4 / N06455
I	2.4858 / Alloy 825 / N08825
D	PVDF
T	3.7035 / Titan Grade 2
Y	others, please specify
4. Process connection:	
00	Without
FA	flanged connection
Y	others, please specify

Please see next page

Itabar-Flow-Sensors

IBF-100 continuation	
Code	Description
4.1 standard:	
E	EN 1092-1
A	ASME B 16.5
D	DIN (according to type & pressure rating)
Y	others, please specify
4.2 nominal size:	
80	DN80
30	3"
Y99	others, please specify
4.3 Pressure class:	
C	PN16
K	150 lbs.
Y9	others, please specify
4.4 Flange face process connection flange:	
E0	EN 1092-1 Form A (without sealing strip; Ra 3.2-12.5µm)
E1	EN 1092-1 Form B1 (raised sealing strip; Ra 3,2-12,5µm)
E2	EN 1092-1 Form B2 (raised sealing strip; Ra 0,8-3,2µm)
E3	EN 1092-1 Form C (tongue; Ra 0,8-3,2µm)
E4	EN 1092-1 Form D (groove; Ra 0,8-3,2µm)
A1	ASME B 16.5 Raised Face (RF)
A2	ASME B 16.5 Raised Face Smooth Finish (RFSF)
A3	ASME B 16.5 Flat Face (FF)
A4	ASME B 16.5 Ring-Type Joint (RTJ)
A5	ASME B 16.5 Tongue (ASME)
A6	ASME B 16.5 Groove (ASME)
D1	DIN Form A (without special demand)
D2	DIN Form B (raised sealing strip ; Rz = 160µm)
D3	DIN Form C (raised sealing strip ; Rz = 160µm)
D4	DIN Form D (raised sealing strip ; Rz = 40µm)
D5	DIN Form E (raised sealing strip ; Rz = 16µm)
D6	DIN Form F (tongue acc. DIN 2512)
D7	DIN Form N (groove acc. DIN 2512)
Y9#	others, please specify
4.5 Gasket:	
0	without
A	material: PTFE, thickness: 2 mm, max. 150°C (302°F)
B	Fibre-reinforced flat gasket; Klingsil C4400, thickness: 2 mm; max. 200°C (392°F)
C	Sp. wd gasket w/ IR(316)&AR(CS) flg graphite; thickn.: 4.5 mm; max. 450°C (842°F)
D	Sp.wd gasket w/IR(316SS)&AR(316SS) flg graphite;thickn.:4.5mm;max.450°C (842°F)
RO	Ring-Joint Seal Type R-Oval ASME B16.20
Y9	others, please specify

Please see next page

IBF-100 continuation	
Code	Description
4.6 Bolts / nuts:	
0	without
1	DIN931 (ISO 4014) hex-head screw with one nut; material: 5.6/5.2 (carbon steel zinc-plated)
2	DIN931 (ISO 4014) hex-head screw with one nut; material: A2-70 (stainless steel)
3	DIN 2510 Form L Material: 1.1181 / CK35
4	DIN 2510 Form L Material: 1.4301 / A2-70
5	ASME B16.5 Material: A193 Gr. B7 / A194 Gr. 2H (galvanised)
6	ASME B16.5 Material: A193 Gr. B8 Cl.1 / A194 Gr. 8
Y9	others, please specify
5. Design mounting part:	
0	without (provided by others / customer /)
R	mounting stud with flange (standard)
W0	weldolet assembly, stud with flange
Y9	others, please specify
5.1 Material mounting stud:	
C	P250GH / A105
S	1.4404 / 316L
V	1.4571 / 316Ti
X	1.4462 / ASTM F51 / Duplex
K	1.4539 / AISI 904L
N	1.4841 / AISI 314
M	2.4360 / Alloy 400 / N04400
H	2.4610 / Alloy C4 / N06455
I	2.4858 / Alloy 825 / N08825
T	3.7035 / Titan Grade 2
D	PVDF
Y	others, please specify
5.2 standard:	
E	EN 1092-1
A	ASME B 16.5
D	DIN (according to type & pressure rating)
Y	others, please specify
5.3 nominal size:	
80	DN80
30	3"
Y9	others, please specify

Please see next page

Itabar-Flow-Sensors

IBF-100 continuation	
Code	Description
5.4 Pressure class:	
C	PN16
K	150 lbs.
Y9	others, please specify
5.5 Flange face mounting stud flange:	
E0	EN 1092-1 Form A (without sealing strip; Ra 3.2-12.5µm)
E1	EN 1092-1 Form B1 (raised sealing strip; Ra 3,2-12,5µm)
E2	EN 1092-1 Form B2 (raised sealing strip; Ra 0,8-3,2µm)
E3	EN 1092-1 Form C (tongue; Ra 0,8-3,2µm)
E4	EN 1092-1 Form D (groove; Ra 0,8-3,2µm)
A1	ASME B 16.5 Raised Face (RF)
A2	ASME B 16.5 Raised Face Smooth Finish (RFSF)
A3	ASME B 16.5 Flat Face (FF)
A4	ASME B 16.5 Ring-Type Joint (RTJ)
A5	ASME B 16.5 Tongue (ASME)
A6	ASME B 16.5 Groove (ASME)
D1	DIN Form A (without special demand)
D2	DIN Form B (raised sealing strip ; Rz = 160µm)
D3	DIN Form C (raised sealing strip ; Rz = 160µm)
D4	DIN Form D (raised sealing strip ; Rz = 40µm)
D5	DIN Form E (raised sealing strip ; Rz = 16µm)
D6	DIN Form F (tongue acc. DIN 2512)
D7	DIN Form N (groove acc. DIN 2512)
Y9	others, please specify
6. End support (Blindflange material):	
0	without
C	material: C22.8 (similar A105)
S	material: 1.4404 / 316L
V	material: 1.4571 / 316Ti
X	material: 1.4462 / ASTM F51 / Duplex
K	material: 1.4539 / AISI 904L
N	material: 1.4841 / AISI 314
M	material: 2.4360 / Alloy 400 / N04400
H	material: 2.4610 / Alloy C4 / N06455
I	material: 2.4858 / Alloy 825 / N08825
T	material: 3.7035 / Titan Grade 2
D	material: PVDF
Y	others, please specify

Please see next page

IBF-100 continuation	
Code	Description
7. Pipe insulation:	
KI	without
X	insulation in mm (min. 50mm)
Y	others, please specify
8. Pipe run/flow direction:	
HL	horizontal, left
HR	horizontal, right
VD	vertical, down
VU	vertical, upwards
Y9	others, please specify
9. Integrated temperature sensor	
T0	without
TA	3-wire, RTD -50 bis 400°C, without Ex approval, Sensor diameter=Ø3,0mm
TB	3-wire, RTD -50 bis 400°C, Ex approval, Sensor diameter=Ø3,0mm
TC	thermocouple type K with INT5334-A3B non-ex-version; 4...20 mA output
TX	sensor prepared for PT100, probe diameter = Ø3,0mm (customer provision)
Y	others, please specify
9.1 Head transmitter for integrated temperature sensor	
0	without
2	4...20 mA / without Ex approval
3	4...20 mA + HART / without Ex approval
4	Profibus PA / without Ex approval
5	Foundation Fieldbus / without Ex approval
6	4...20 mA / ATEX Ex ia
7	4...20 mA + HART / ATEX Ex ia
8	Profibus PA / ATEX Ex ia
9	Foundation Fieldbus / ATEX Ex ia
Y	others, please specify
10. Differential pressure connection:	
A03	1 pair of nozzles, MNPT1/2" (remote version)
A03A03	2 pair of nozzles, MNPT1/2" (remote version)
A03A03A03	3 pair of nozzles, MNPT1/2" (remote version)
A04	1 pair of nozzles, MNPT1/4" (remote version)
A04A04	2 pair of nozzles, MNPT1/4" (remote version)
A04G	1 pair of nozzles, R1/4" male thread (remote version)
A04GA04G	2 pair of nozzles, R1/4" male thread (remote version)
A04S	1 pair of tube nozzle Ø6x4x1 (remote version)
R12	1 pair of pipe Ø12x1,5x50mm, material: 1.4571 (316Ti)
A12	1 pair Weld-on fitting Ermeto 12S, material: 316SS (remote version)
AS2	1 pair welding connection Ø21.3x3,2mm - welding end (remote version)
AS3	1 pair welding connection Ø21.3x6,3mm - welding end (remote version)
AS4	1 pair welding connection Ø24x4,0mm - welding end (remote version)
A06	IEC 61518; PTFE gasket
A16	IEC 61518; Viton gasket
A26	IEC 61518; PTFE gasket, cranked (for integrated temperature sensor or humid gas)
A36	IEC 61518; Viton gasket, cranked (for integrated temperature sensor or humid gas)
Y99	others, please specify

Please see next page

Itabar-Flow-Sensors

IBF-100 continuation	
Code	Description
11. Shut-off valve for remote version (initial shut-off):	
A00	without
A54G	1 pair ball valve PN40, mat.: CF8M (1.4408), female R1/4", packing: PTFE
A54GA54G	2 pair ball valve PN40, mat.: CF8M (1.4408), female R1/4", packing: PTFE
A56	1 pair ball valve PN40, mat.: CF8M (1.4408), female 1/2" NPT, packing: PTFE
A56A56	2 pair ball valve PN40, mat.: CF8M (1.4408), female 1/2" NPT, packing: PTFE
A56A56A56	3 pair ball valve PN40, mat.: CF8M (1.4408), female 1/2" NPT, packing: PTFE
A62	1 pair valve, PN400, housing: SS316/316L, female 1/2" NPT, packing: Graphite
A62A62	2 pair valve, PN400, housing: SS316/316L, female 1/2" NPT, packing: Graphite
A62A62A62	3 pair valve, PN400, housing: SS316/316L, female 1/2" NPT, packing: Graphite
A81	1 pair gate valve 800lbs. housing: A105, female 1/2" NPT, packing: Graphite
A82	1 pair gate valve 800lbs. housing: 316SS, female 1/2" NPT, packing: Graphite
AV1	1 pair valve, PN400, housing: C22.8 (A105), Ø21,3x6,3/Ø14,0x2,5 , packing: Graphite
AV2	1 pair valve, PN400, hsg: 1.4571 (316Ti), Ø21,3x6,3/Ø14,0x2,5 , packing: Graphite
AV3	valve, PN400, housing: 1.5415 (16Mo3), Ø21,3x6,3/Ø14,0x2,5 , packing: Graphite
Y99	others, please specify
11.1 First shut-off accessories:	
0	without
E12	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø12mm, mat.: 316SS
E14	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø14mm, mat.: 316SS
Y99	others, please specify
11.2 Manifold for remote version:	
0	without
A65P	3-way-manifold, 316/316L, PN420 DN5, In/Out: 1/2"-NPTF/IEC61518-A, pckng: PTFE
A70P	5-way-manifold, 316/316L PN420 DN5, In/Out: 1/2"-NPTF/IEC61518-A, pckng: PTFE
Y99	others, please specify
11.2.1 Mounting set for remote version (manifold):	
0	without
MBC	mounting set, CS zinc-plated, for 2" pipe mtg, incl. screws 7/16-UNF/FPM90-O-Ring
MBS	mounting set, stainless steel, for 2" pipe mtg, incl. screws 7/16-UNF/ FPM90-O-Ring
Y999	others, please specify
11.2.2 Accessories for manifold:	
0	without
E12	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø12mm, mat.: 316SS
E14	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø14mm, mat.: 316SS
Y99	others, please specify
12. Valve block for compact version:	
A000	without
A66M	3-way-manifold, IEC 61518, material: 1.4404 (316L), pkg: PTFE, screws M10
A66U	3-way-manifold, IEC 61518, material: 1.4404 (316L), pkg: PTFE, screws 7/16-UNF
A71M	5-way-manifold, IEC 61518, material: 1.4404 (316L), pkg: PTFE, screws M10
A71U	5-way-manifold, IEC 61518, material: 1.4404 (316L), pig: PTFE, screws 7/16-UNF
Y999	others, please specify
13. Special design/pre-assembly:	
0	without
M01	mounting of dp transmitter (customer provision)
M03	mounting of p transmitter (customer provision) with oval flange, mat. st.st.
A4	cleaned from oil+grease certificate
A5	oxygen service certificate
A6	PWIS free certificate (PWIS = paint-wetting impairment substances)
Y99	others, please specify

FT

B.3 Itabar for Liquids and Gases (Flo Tap-Version)

FTN

B.3.1 Flo-Tap-Version with threaded process connection

Types: FTN-20/21/25/26/35/36 (up to 87 [PN6] psi)

a.) Description:

The FTN ITABAR-sensor series is designed to measure the volumetric flow of liquids, gases and steam.

The construction features a welding boss between the pipe and the sensor-related parts and a compression fitting to seal the sensor profile. A safety chain between the installed sensor and the pipe serves as a protective device during the removal process.

A FTN sensor is usable up to an operating pressure of 88 psi and an operating temperature of up to 200°C.

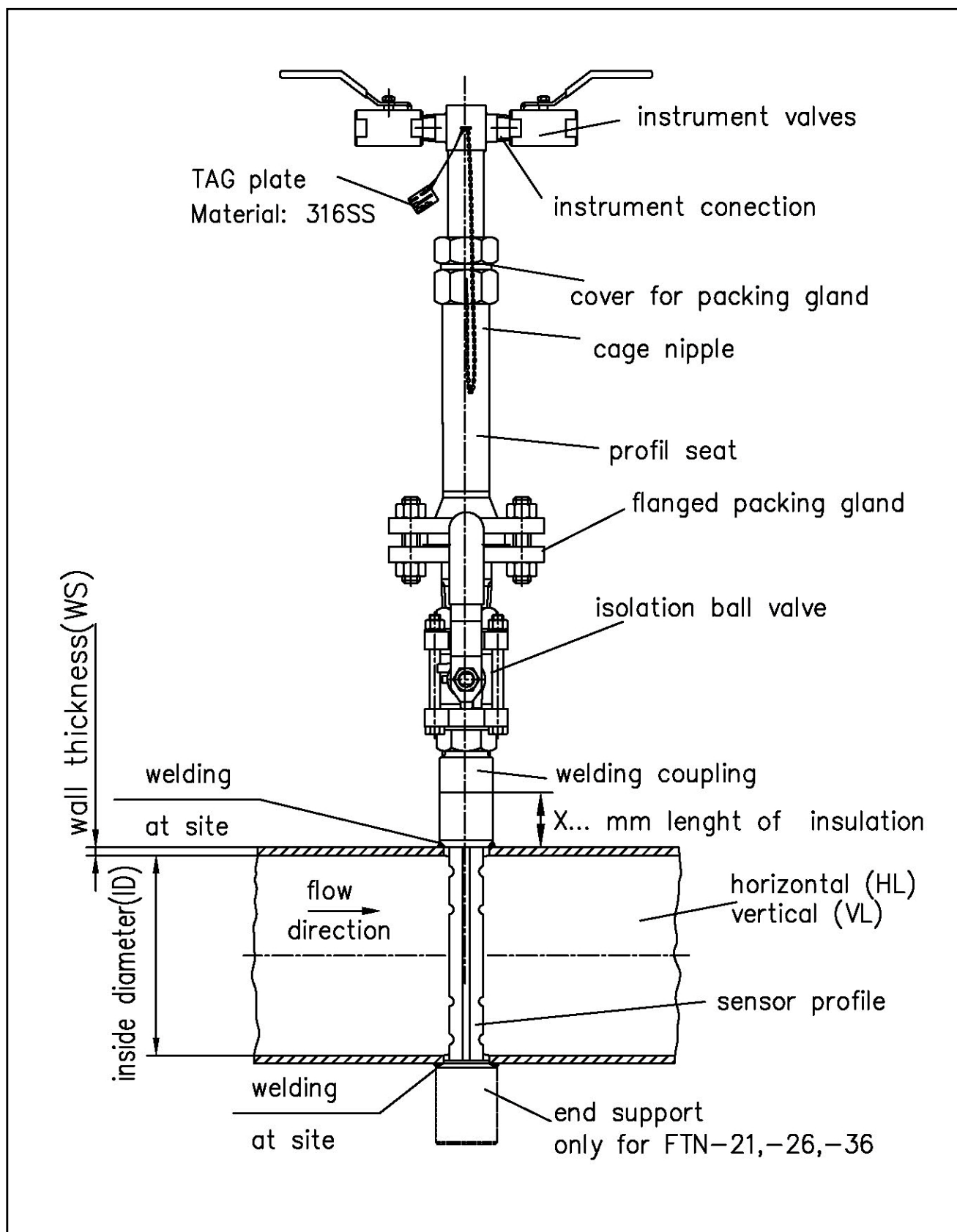
In cases where the WINFLOW sizing program recommends a counter end support because of the high flow velocity it is better to select the next size sensor model. During the initial installation it is not possible to install a sensor counter support. During subsequent installations under pressure it can also be difficult to meet the counter support at the opposite end of the pipe. Furthermore the maximum installation values listed in the WINFLOW-program must be observed.



Fig 49: Itabar type FTN-25

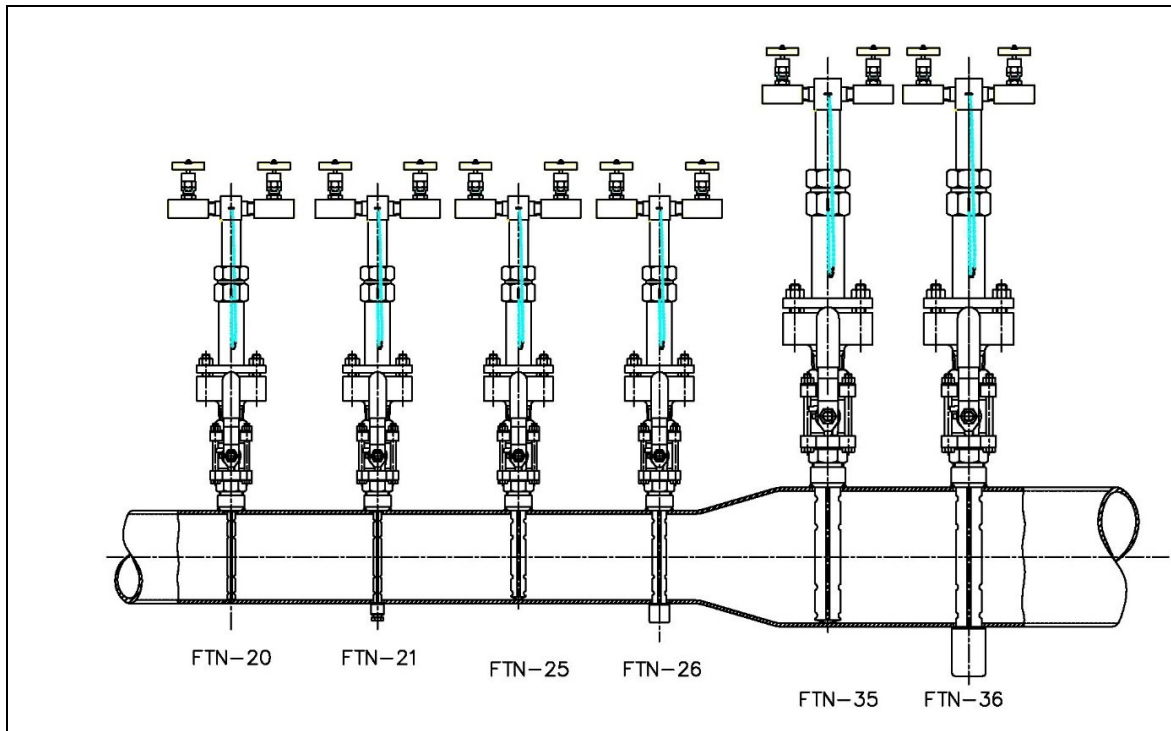
Itabar-Flow-Sensors

b.) Drawings for FTN



c.) Order Data for Itabar® Series FTN-20/21/25/26/35/36

c.1) Sensor type:



Pipe diameter		Maximum allowable volumetric flow in m³/h					
		Sensor type					
Inches..... mm		FTN -20	FTN -21	FTN -25	FTN -26	FTN -35	FTN -36
1 1/2	DN 40	40	114	---	---	---	---
2	DN 50	59	161	---	---	---	---
2 1/4	DN 65	93	243	---	---	---	---
3	DN 80	130	328	---	---	---	---
4	DN 100	179	439	205	544	---	---
5	DN 125	---	---	281	719	---	---
6	DN 150	---	---	358	894	---	---
8	DN 200	---	---	515	1242	---	---
10	DN 250	---	---	687	1623	---	---
12	DN 300	---	---	872	2034	1757	4204
14	DN 350	---	---	1053	2433	2142	5067
16	DN 400	---	---	1226	2828	2532	5938
20	DN 500	---	---	1592	3627	3283	7611
24	DN 600	---	---	1949	4423	4052	9327
28	DN 700	---	---	2318	5237	4851	11106
32	DN 800	---	---	2704	6099	5667	12930
36	DN 900	---	---	---	7000	---	14790
40	DN 1000	---	---	---	7921	---	16614
48	DN 1200	---	---	---	9763	---	20450
56	DN 1400	---	---	---	---	---	24220
64	DN 1600	---	---	---	---	---	27987
72	DN 1800	---	---	---	---	---	31613
80	DN 2000	---	---	---	---	---	---

These values are for water of $\rho = 0,9982 \text{ kg/l}$ SGU and at a temperature $T = 20 \text{ }^{\circ}\text{C}$. To calculate volumetric or mass flow of fluids with other densities see chapter 6 „Specifications of DP Sensors with WINFLOW“.

Itabar-Flow-Sensors

d) Order Specifications Itabar-Flow-Sensor, Series FTN

d1) FTN-20/21

ITABAR®-FLOW-SENSOR for Liquids and Gases, Flo-Tap-Version, threaded connection.	
Code	Description
1. Type:	
FTN-20	Sensor Ø12mm (FloTap version with screwed process connection) (max. PN6) for liquids and gases without end support
FTN-21	Sensor Ø12mm (FloTap version with screwed process connection) (max. PN6) for liquids and gases with end support
2. Pipe (duct) size: (ID/WT):	
DN040	DN 40 / 1-1/2"
DN050	DN 50 / 2"
DN065	DN 65 / 2-1/2"
DN080	DN 80 / 3"
DN100	DN 100 / 4"
Y9	others, please specify
3. Material sensor:	
V	1.4571 / 316Ti
Y	Special design
4. Welding Coupling	
000	without
001	material: C22.8 (similar A105)
003	material: 1.4571 / 316Ti
Y9	Special design
5. End support:	
00	without
01	material: C22.8 (similar A105)
03	material: 1.4571/316Ti
Y9	Special design
6. Isolation valve for the sensor profile:	
00	without
A01	ball valve PN16/40, mat.: CS, female 1" NPT, packing: PTFE
A02	ball valve PN16/40, mat.: CF8M (1.4408), female 1" NPT, packing: PTFE
Y9	Special design
7. Flanged packing gland:	
S	Flanged packing gland
Y9	Special design
8. Cage nipple:	
PC	material: P235GH (similar A106)
PV	material: 1.4571 / 316Ti
Y9	Special design
9. Packing material for the flanged and welded packing gland:	
1	packing material: PTFE, max. 200°C
2	packing material: graphite, max. 400°C
Y9	Special design
10. Pipe insulation:	
KI	without
X	insulation in mm (min. 50mm)
Y	Special design

Please see next page

FTN-20/21 continuation	
Code	Description
11. Pipe run/flow direction:	
HL	horizontal, left
HR	horizontal, right
VD	vertical, down
VU	vertical, upwards
Y9	Special design
12. Integrated temperature sensor:	
T0	without
TA	3-wire, RTD -50 bis 400°C, without Ex approval, Sensor diameter=Ø0.5mm
TB	sensor prepared for PT100, probe diameter = Ø0.5mm (customer provision)
TC	thermocouple type K with INT5334-A3B non-ex-version; 4...20 mA output
Y	Special design
12.1 Head transmitter for integrated RTD:	
0	without
2	4...20 mA / without Ex approval
3	4...20 mA + HART / without Ex approval
4	Profibus PA / without Ex approval
5	Foundation Fieldbus / without Ex approval
6	4...20 mA / ATEX Ex ia
7	4...20 mA + HART / ATEX Ex ia
8	Profibus PA / ATEX Ex ia
9	Foundation Fieldbus / ATEX Ex ia
Y	Special design
13. Differential pressure connection:	
A03	1 pair of nozzles, MNPT1/2" (remote version)
A03A03	2 pair of nozzles, MNPT1/2" (remote version)
A03A03A03	3 pair of nozzles, MNPT1/2" (remote version)
A04	1 pair of nozzles, MNPT1/4" (remote version)
A04A04	2 pair of nozzles, MNPT1/4" (remote version)
A04G	1 pair of nozzles, R1/4" male thread (remote version)
A04GA04G	2 pair of nozzles, R1/4" male thread (remote version)
A04S	1 pair of tube nozzle Ø6x4x1 (remote version)
R12	1 pair of pipe Ø12x1,5x50mm, material: 1.4571 (316Ti)
A12	1 pair Weld-on fitting Ermeto 12S, material: 316SS (remote version)
AS2	1 pair welding connection Ø21.3x3,2mm - welding end (remote version)
AS3	1 pair welding connection Ø21.3x6,3mm - welding end (remote version)
AS4	1 pair welding connection Ø24x4,0mm - welding end (remote version)
A06	IEC 61518; PTFE gasket
A16	IEC 61518; Viton gasket
A26	IEC 61518; PTFE gasket, cranked (for integrated temperature sensor or humid gas)
A36	IEC 61518; Viton gasket, cranked (for integrated temperature sensor or humid gas)
Y99	Special design

Please see next page

Itabar-Flow-Sensors

FTN-20/21 continuation	
Code	Description
14. Shut-off valve for remote version (initial shut-off):	
A00	without
A54G	1 pair ball valve PN40, mat.: CF8M (1.4408), female R1/4", packing: PTFE
A54GA54G	2 pair ball valve PN40, mat.: CF8M (1.4408), female R1/4", packing: PTFE
A56	1 pair ball valve PN40, mat.: CF8M (1.4408), female 1/2" NPT, packing: PTFE
A56A56	2 pair ball valve PN40, mat.: CF8M (1.4408), female 1/2" NPT, packing: PTFE
A56A56A56	3 pair ball valve PN40, mat.: CF8M (1.4408), female 1/2" NPT, packing: PTFE
A62	1 pair valve, PN400, housing: SS316/316L, female 1/2" NPT, packing: Graphite
A62A62	2 pair valve, PN400, housing: SS316/316L, female 1/2" NPT, packing: Graphite
A62A62A62	3 pair valve, PN400, housing: SS316/316L, female 1/2" NPT, packing: Graphite
A81	1 pair gate valve 800lbs. housing: A105, female 1/2" NPT, packing: Graphite
A82	1 pair gate valve 800lbs. housing: 316SS, female 1/2" NPT, packing: Graphite
AV1	1 pair valve, PN400, housing: C22.8 (A105), Ø21,3x6,3/Ø14,0x2,5 , packing: Graphite
AV2	1 pair valve, PN400, housing: 1.4571 (316Ti), Ø21,3x6,3/Ø14,0x2,5 , pckg: Graphite
AV3	valve, PN400, housing: 1.5415 (16Mo3), Ø21,3x6,3/Ø14,0x2,5 , packing: Graphite
Y99	Special design
14.1 First Shut-off accessories:	
0	without
E12	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø12mm, mat.: 316SS
E14	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø14mm, mat.: 316SS
Y99	Special design
14.2 Manifold for remote variant:	
0	without
MBC	3-way-manifold, 316/316L, PN420 DN5, In/Out: 1/2"-NPTF/IEC61518-A, pckg: PTFE
MBS	5-way-manifold, 316/316L PN420 DN5, In/Out: 1/2"-NPTF/IEC61518-A, pckg: PTFE
Y99	Special design
14.2.1 Mounting set for remote version (manifold):	
0	without
MBC	mounting set, CS zinc-plated, for 2" pipe mtg, incl. screws 7/16-UNF/ FPM90-O-Ring
MBS	mounting set, stainless steel, for 2" pipe mtg, incl. screws 7/16-UNF/ FPM90-O-Ring
Y99	Special design
14.2.2 Accessories for manifold:	
0	without
E12	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø12mm, mat.: 316SS
E14	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø14mm, mat.: 316SS
Y99	Special design
15. Valve block for compact variant:	
A000	without
A66M	3-way-manifold, IEC 61518, mat.: 1.4404 (316L), pckg: PTFE, screws M10
A66U	3-way-manifold, IEC 61518, mat.: 1.4404 (316L), pckg: PTFE, screws 7/16-UNF
A71M	5-way-manifold, IEC 61518, mat.: 1.4404 (316L), pckg: PTFE, screws M10
A71U	5-way-manifold, IEC 61518, mat.: 1.4404 (316L), pckg: PTFE, screws 7/16-UNF
Y999	Special design
16. Special design / pre-assembly:	
0	without
M01	mounting of dp transmitter (customer provision)
M03	mounting of p transmitter (customer provision) with oval flange, mat. st.st.
A4	cleaned from oil+grease certificate
A5	oxygen service certificate
A6	PWIS free certificate (PWIS = paint-wetting impairment substances)
Y99	Special design

d2) FTN-25/26

ITABAR®-FLOW-SENSOR for Liquids and Gases, Flo-Tap-Version, threaded connection.	
Code	Description
1. Type:	
FTN-25	Sensor Ø25,4mm (FloTap version with screwed process connection) (max. PN6) for liquids and gases without end support
FTN-26	Sensor Ø25,4mm (FloTap version with screwed process connection) (max. PN6) for liquids and gases with endsupport
2. Pipe (duct) size: (ID/WT):	
DN100	DN 100 / 4"
DN125	DN 125 / 5"
DN150	DN 150 / 6"
DN200	DN 200 / 8"
DN250	DN 250 / 10"
DN300	DN 300 / 12"
DN350	DN 350 / 14"
DN400	DN 400 / 16"
DN450	DN 450 / 18"
DN500	DN 500 / 20"
DN600	DN 600 / 24"
DN700	DN 700 / 28"
DN800	DN 800 / 32"
DN900	DN 900 / 36"
DN1000	DN 1000 / 40"
DN1100	DN 1100 / 44"
DN1200	DN 1200 / 48"
Y9	others, please specify
3. Material sensor:	
S	1.4404 / 316L
V	1.4571 / 316Ti
Y	Special design
4. Welding Coupling	
000	without
001	material: C22.8 (similar A105)
002	material: 1.4404 / 316L
003	material: 1.4571 / 316Ti
Y9	Special design
5. End support:	
00	without
01	material: C22.8 (similar A105)
02	material: 1.4404 / 316L
03	material: 1.4571/316Ti
Y9	Special design

Please see next page

Itabar-Flow-Sensors

FTN-25/26 continuation	
Code	Description
6. Isolation valve for the sensor profile:	
00	without
A05	ball valve PN16/40, mat.: CS, female 1 1/2" NPT, packing: PTFE
A06	ball valve PN16/40, mat.: CF8M (1.4408), female 1 1/2" NPT, packing: PTFE
Y9	Special design
7. Flanged packing gland:	
S	1.4404 / 316L
V	1.4571 / 316Ti
Y9	Special design
8. Cage nipple:	
PC	material: P235GH (similar A106)
PS	material: 1.4404 / 316L
PV	material: 1.4571 / 316Ti
Y9	Special design
9. Packing material for the flanged and welded packing gland:	
1	packing material: PTFE, max. 200°C
2	packing material: graphite, max. 400°C
Y9	Special design
10. Pipe insulation:	
KI	without
X	insulation in mm (min. 50mm)
Y	Special design
11. Pipe run/flow direction:	
HL	horizontal, left
HR	horizontal, right
VD	vertical, down
VU	vertical, upwards
Y9	Special design
12. Integrated temperature sensor:	
T0	without
TA	3-wire, RTD -50 bis 400°C, without Ex approval, Sensor diameter=Ø0.5mm
TB	sensor prepared for PT100, probe diameter = Ø0.5mm (customer provision)
TC	thermocouple type K with INT5334-A3B non-ex-version; 4...20 mA output
TX	sensor prepared for PT100, probe diameter = Ø3,0mm (customer provision)
Y	Special design
12.1 Head transmitter for integrated RTD:	
0	without
2	4...20 mA / without Ex approval
3	4...20 mA + HART / without Ex approval
4	Profibus PA / without Ex approval
5	Foundation Fieldbus / without Ex approval
6	4...20 mA / ATEX Ex ia
7	4...20 mA + HART / ATEX Ex ia
8	Profibus PA / ATEX Ex ia
9	Foundation Fieldbus / ATEX Ex ia
Y	Special design

Please see next page

FTN-25/26 continuation	
Code	Description
13. Differential pressure connection:	
A03	1 pair of nozzles, MNPT 1/2" (remote version)
A03A03	2 pair of nozzles, MNPT 1/2" (remote version)
A03A03A03	3 pair of nozzles, MNPT 1/2" (remote version)
A04	1 pair of nozzles, MNPT 1/4" (remote version)
A04A04	2 pair of nozzles, MNPT 1/4" (remote version)
A04G	1 pair of nozzles, R1/4" male thread (remote version)
A04GA04G	2 pair of nozzles, R1/4" male thread (remote version)
A04S	1 pair of tube nozzle Ø6x4x1 (remote version)
R12	1 pair of pipe Ø12x1,5x50mm, material: 1.4571 (316Ti)
A12	1 pair Weld-on fitting Ermeto 12S, material: 316SS (remote version)
AS2	1 pair welding connection Ø21.3x3,2mm - welding end (remote version)
AS3	1 pair welding connection Ø21.3x6,3mm - welding end (remote version)
AS4	1 pair welding connection Ø24x4,0mm - welding end (remote version)
A06	IEC 61518; PTFE gasket
A16	IEC 61518; Viton gasket
A26	IEC 61518; PTFE gasket, cranked (for integrated temperature sensor or humid gas)
A36	IEC 61518; Viton gasket, cranked (for integrated temperature sensor or humid gas)
Y99	Special design
14. Shut-off valve for remote version (initial shut-off):	
A00	without
A54G	1 pair ball valve PN40, mat.: CF8M (1.4408), female R1/4", packing: PTFE
A54GA54G	2 pair ball valve PN40, mat.: CF8M (1.4408), female R1/4", packing: PTFE
A56	1 pair ball valve PN40, mat.: CF8M (1.4408), female 1/2" NPT, packing: PTFE
A56A56	2 pair ball valve PN40, mat.: CF8M (1.4408), female 1/2" NPT, packing: PTFE
A56A56A56	3 pair ball valve PN40, mat.: CF8M (1.4408), female 1/2" NPT, packing: PTFE
A62	1 pair valve, PN400, housing: SS316/316L, female 1/2" NPT, packing: Graphite
A62A62	2 pair valve, PN400, housing: SS316/316L, female 1/2" NPT, packing: Graphite
A62A62A62	3 pair valve, PN400, housing: SS316/316L, female 1/2" NPT, packing: Graphite
A81	1 pair gate valve 800lbs. housing: A105, female 1/2" NPT, packing: Graphite
A82	1 pair gate valve 800lbs. housing: 316SS, female 1/2" NPT, packing: Graphite
AV1	1 pair valve, PN400, housing: C22.8 (A105), Ø21,3x6,3/Ø14,0x2,5, packing: Graphite
AV2	1 pair valve, PN400, housing: 1.4571 (316Ti), Ø21,3x6,3/Ø14,0x2,5, pckg: Graphite
AV3	valve, PN400, housing: 1.5415 (16Mo3), Ø21,3x6,3/Ø14,0x2,5, packing: Graphite
Y99	Special design
14.1 First Shut-off accessories:	
0	without
E12	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø12mm, mat.: 316SS
E14	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø14mm, mat.: 316SS
Y99	Special design
14.2 Manifold for remote variant:	
0	without
A65P	3-way-manifold, 316/316L, PN420 DN5, In/Out: 1/2"-NPTF/IEC61518-A, pckg: PTFE
A70P	5-way-manifold, 316/316L PN420 DN5, In/Out: 1/2"-NPTF/IEC61518-A, pckg: PTFE
Y99	Special design

Please see next page

Itabar-Flow-Sensors

FTN-25/26 continuation	
Code	Description
14.2.1 Mounting set for remote version (manifold):	
0	without
MBC	mounting set, CS zinc-plated, for 2" pipe mtg, incl. screws 7/16-UNF/ FPM90-O-Ring
MBS	mounting set, stainless steel, for 2" pipe mtg, incl. screws 7/16-UNF/ FPM90-O-Ring
Y99	Special design
14.2.2 Accessories for manifold:	
0	without
E12	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø12mm, mat.: 316SS
E14	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø14mm, mat.: 316SS
Y99	Special design
15. Valve block for compact variant:	
A000	without
A66M	3-way-manifold, IEC 61518, mat.: 1.4404 (316L), pckg: PTFE, screws M10
A66U	3-way-manifold, IEC 61518, mat.: 1.4404 (316L), pckg: PTFE, screws 7/16-UNF
A71M	5-way-manifold, IEC 61518, mat.: 1.4404 (316L), pckg: PTFE, screws M10
A71U	5-way-manifold, IEC 61518, mat.: 1.4404 (316L), pckg: PTFE, screws 7/16-UNF
Y999	Special design
15. Valve block for compact variant:	
0	without
M01	mounting of dp transmitter (customer provision)
M03	mounting of p transmitter (customer provision) with oval flange, mat. st.st.
A4	cleaned from oil+grease certificate
A5	oxygen service certificate
A6	PWIS free certificate (PWIS = paint-wetting impairment substances)
Y99	Special design

D3) FTN-35/36

ITABAR®-FLOW-SENSOR for Liquids and Gases, Flo-Tap-Version, threaded connection.	
Code	Description
1. Type:	
FTN-35	Sensor Ø42mm (FloTap version with screwed process connection) (max. PN6) for liquids and gases without end support
FTN-36	Sensor Ø42mm (FloTap version with screwed process connection) (max. PN6) for liquids and gases with end support
2. Pipe (duct) size: (ID/WT):	
DN100	DN 100 / 4"
DN125	DN 125 / 5"
DN150	DN 150 / 6"
DN200	DN 200 / 8"
DN250	DN 250 / 10"
DN300	DN 300 / 12"
DN350	DN 350 / 14"
DN400	DN 400 / 16"
DN450	DN 450 / 18"
DN500	DN 500 / 20"
DN600	DN 600 / 24"
DN700	DN 700 / 28"
DN800	DN 800 / 32"
DN900	DN 900 / 36"
DN1000	DN 1000 / 40"
DN1100	DN 1100 / 44"
DN1200	DN 1200 / 48"
Y9	others, please specify
3. Material sensor:	
S	1.4404 / 316L
V	1.4571 / 316Ti
Y	Special design
4. Welding Coupling	
000	Without
001	material: C22.8 (similar A105)
002	material: 1.4404 / 316L
003	material: 1.4571 / 316Ti
Y9	Special design
5. End support:	
00	without
01	material: C22.8 (similar A105)
02	material: 1.4404 / 316L
03	material: 1.4571/316Ti
Y9	Special design

Please see next page

Itabar-Flow-Sensors

FTN-35/36 continuation	
Code	Description
6. Isolation valve for the sensor profile:	
00	without
A09	ball valve PN16/40, mat.: CS, female 2" NPT, packing: PTFE
A10	ball valve PN16/40, mat.: CF8M (1.4408), female 2" NPT, packing: PTFE
Y9	Special design
7. Flanged packing gland:	
S	1.4404 / 316L
V	1.4571 / 316Ti
Y9	Special design
8. Cage nipple:	
PC	material: P235GH (similar A106)
PS	material: 1.4404 / 316L
PV	material: 1.4571 / 316Ti
Y9	Special design
9. Packing material for the flanged and welded packing gland:	
1	packing material: PTFE, max. 200°C
2	packing material: graphite, max. 400°C
Y9	Special design
10. Pipe insulation:	
KI	Without
X	insulation in mm (min. 50mm)
Y	Special design
11. Pipe run/flow direction:	
HL	horizontal, left
HR	horizontal, right
VD	vertical, down
VU	vertical, upwards
Y9	Special design
12. Integrated temperature sensor:	
T0	without
TA	3-wire, RTD -50 bis 400°C, without Ex approval, Sensor diameter=Ø0.5mm
TB	sensor prepared for PT100, probe diameter = Ø0.5mm (customer provision)
TC	thermocouple type K with INT5334-A3B non-ex-version; 4...20 mA output
TX	sensor prepared for PT100, probe diameter = Ø3,0mm (customer provision)
Y	Special design
12.1 Head transmitter for integrated RTD:	
0	without
2	4...20 mA / without Ex approval
3	4...20 mA + HART / without Ex approval
4	Profibus PA / without Ex approval
5	Foundation Fieldbus / without Ex approval
6	4...20 mA / ATEX Ex ia
7	4...20 mA + HART / ATEX Ex ia
8	Profibus PA / ATEX Ex ia
9	Foundation Fieldbus / ATEX Ex ia
Y	Special design

Please see next page

FTN-35/36 continuation	
Code	Description
13. Differential pressure connection:	
A03	1 pair of nozzles, MNPT 1/2" (remote version)
A03A03	2 pair of nozzles, MNPT 1/2" (remote version)
A03A03A03	3 pair of nozzles, MNPT 1/2" (remote version)
A04	1 pair of nozzles, MNPT 1/4" (remote version)
A04A04	2 pair of nozzles, MNPT 1/4" (remote version)
A04G	1 pair of nozzles, R1/4" male thread (remote version)
A04GA04G	2 pair of nozzles, R1/4" male thread (remote version)
A04S	1 pair of tube nozzle Ø6x4x1 (remote version)
R12	1 pair of pipe Ø12x1,5x50mm, material: 1.4571 (316Ti)
A12	1 pair Weld-on fitting Ermeto 12S, material: 316SS (remote version)
AS2	1 pair welding connection Ø21.3x3,2mm - welding end (remote version)
AS3	1 pair welding connection Ø21.3x6,3mm - welding end (remote version)
AS4	1 pair welding connection Ø24x4,0mm - welding end (remote version)
A06	IEC 61518; PTFE gasket
A16	IEC 61518; Viton gasket
A26	IEC 61518; PTFE gasket, cranked (for integrated temperature sensor or humid gas)
A36	IEC 61518; Viton gasket, cranked (for integrated temperature sensor or humid gas)
Y99	Special design
14. Shut-off valve for remote version (initial shut-off):	
A00	without
A54G	1 pair ball valve PN40, mat.: CF8M (1.4408), female R1/4", packing: PTFE
A54GA54G	2 pair ball valve PN40, mat.: CF8M (1.4408), female R1/4", packing: PTFE
A56	1 pair ball valve PN40, mat.: CF8M (1.4408), female 1/2" NPT, packing: PTFE
A56A56	2 pair ball valve PN40, mat.: CF8M (1.4408), female 1/2" NPT, packing: PTFE
A56A56A56	3 pair ball valve PN40, mat.: CF8M (1.4408), female 1/2" NPT, packing: PTFE
A62	1 pair valve, PN400, housing: SS316/316L, female 1/2" NPT, packing: Graphite
A62A62	2 pair valve, PN400, housing: SS316/316L, female 1/2" NPT, packing: Graphite
A62A62A62	3 pair valve, PN400, housing: SS316/316L, female 1/2" NPT, packing: Graphite
A81	1 pair gate valve 800lbs. housing: A105, female 1/2" NPT, packing: Graphite
A82	1 pair gate valve 800lbs. housing: 316SS, female 1/2" NPT, packing: Graphite
AV1	1 pair valve, PN400, housing: C22.8 (A105), Ø21,3x6,3/Ø14,0x2,5 , packing: Graphite
AV2	1 pair valve, PN400, housing: 1.4571 (316Ti), Ø21,3x6,3/Ø14,0x2,5 , pckg: Graphite
AV3	valve, PN400, housing: 1.5415 (16Mo3), Ø21,3x6,3/Ø14,0x2,5 , packing: Graphite
Y99	Special design
14.1 First Shut-off accessories:	
0	without
E12	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø12mm, mat.: 316SS
E14	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø14mm, mat.: 316SS
Y99	Special design
14.2 Manifold for remote variant:	
0	without
A65P	3-way-manifold, 316/316L, PN420 DN5, In/Out: 1/2"-NPTF/IEC61518-A, pckg: PTFE
A70P	5-way-manifold, 316/316L PN420 DN5, In/Out: 1/2"-NPTF/IEC61518-A, pckg: PTFE
Y99	Special design

Please see next page

Itabar-Flow-Sensors

FTN-35/36 continuation	
Code	Description
14.2.1 Mounting set for remote version (manifold):	
0	without
MBC	mounting set, CS zinc-plated, for 2" pipe mtg, incl. screws 7/16-UNF/ FPM90-O-Ring
MBS	mounting set, stainless steel, for 2" pipe mtg, incl. screws 7/16-UNF/ FPM90-O-Ring
Y99	Special design
14.2.2 Accessories for manifold:	
0	without
E12	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø12mm, mat.: 316SS
E14	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø14mm, mat.: 316SS
Y99	Special design
15. Valve block for compact variant:	
A000	without
A66M	3-way-manifold, IEC 61518, mat.: 1.4404 (316L), pckg: PTFE, screws M10
A66U	3-way-manifold, IEC 61518, mat.: 1.4404 (316L), pckg: PTFE, screws 7/16-UNF
A71M	5-way-manifold, IEC 61518, mat.: 1.4404 (316L), pckg: PTFE, screws M10
A71U	5-way-manifold, IEC 61518, mat.: 1.4404 (316L), pckg: PTFE, screws 7/16-UNF
Y999	Special design
15. Valve block for compact variant:	
0	without
M01	mounting of dp transmitter (customer provision)
M03	mounting of p transmitter (customer provision) with oval flange, mat. st.st.
A4	cleaned from oil+grease certificate
A5	oxygen service certificate
A6	PWIS free certificate (PWIS = paint-wetting impairment substances)
Y99	Special design

FTM

B.3.2 Flo-Tap-Version with threaded process connection and guide-rod-spindles

Types: FTM-20/21/25/26/35/36 (up to 580 [PN40] psi)

a) Description

The FTM ITABAR-Sensor series is designed to measure volumetric flow of liquids and gases. The insertion or removal of the sensor is made easy by two guide-rod spindles or (as an option) via a hand wheel driven gearbox. The FTM sensor is applicable to an operating pressure of up to 580 psi (PN40) and an operating temperature of up to 572 °F (300°C).

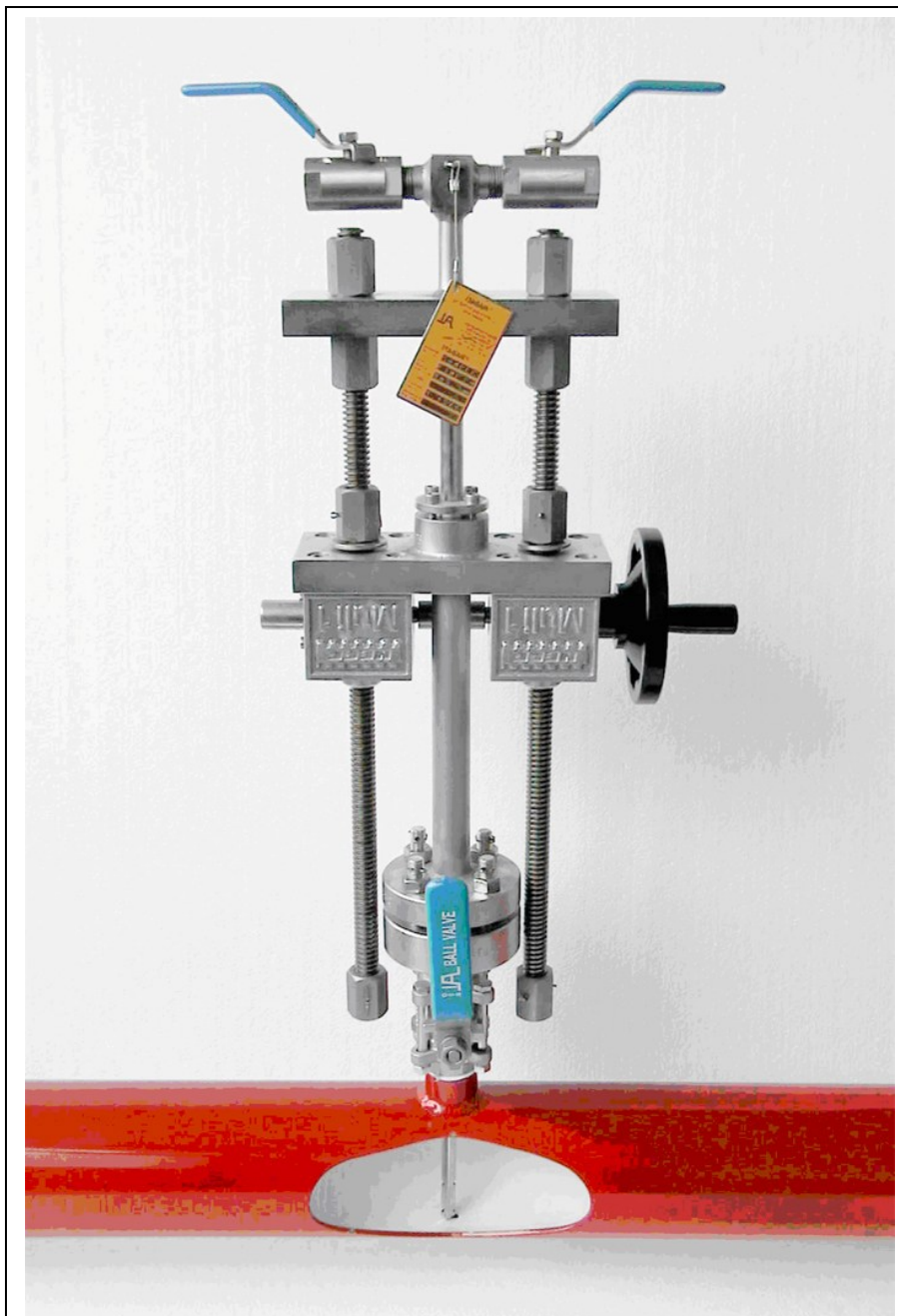
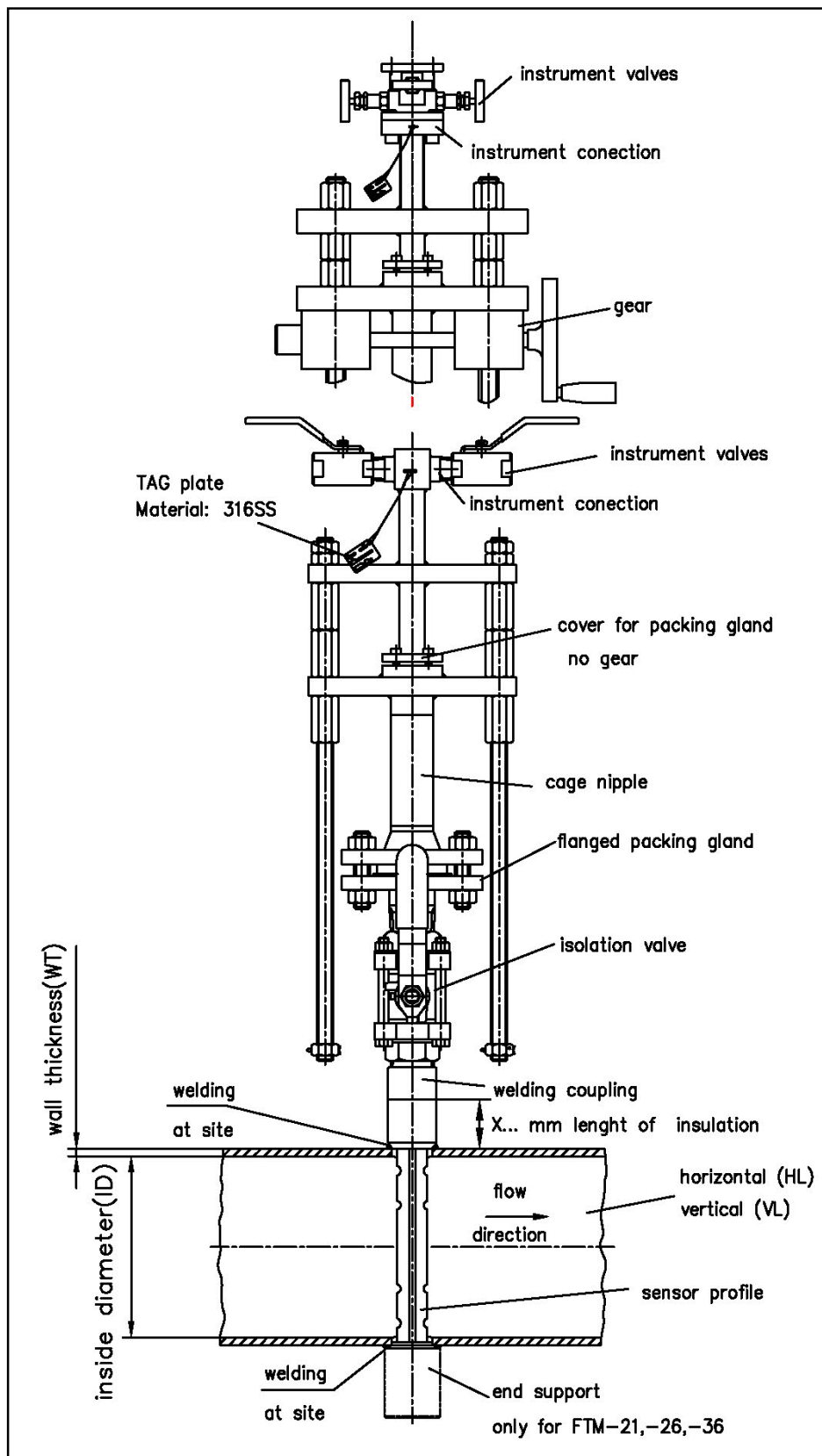


Fig 50: FTM-20 with gear box and hand wheel (option)

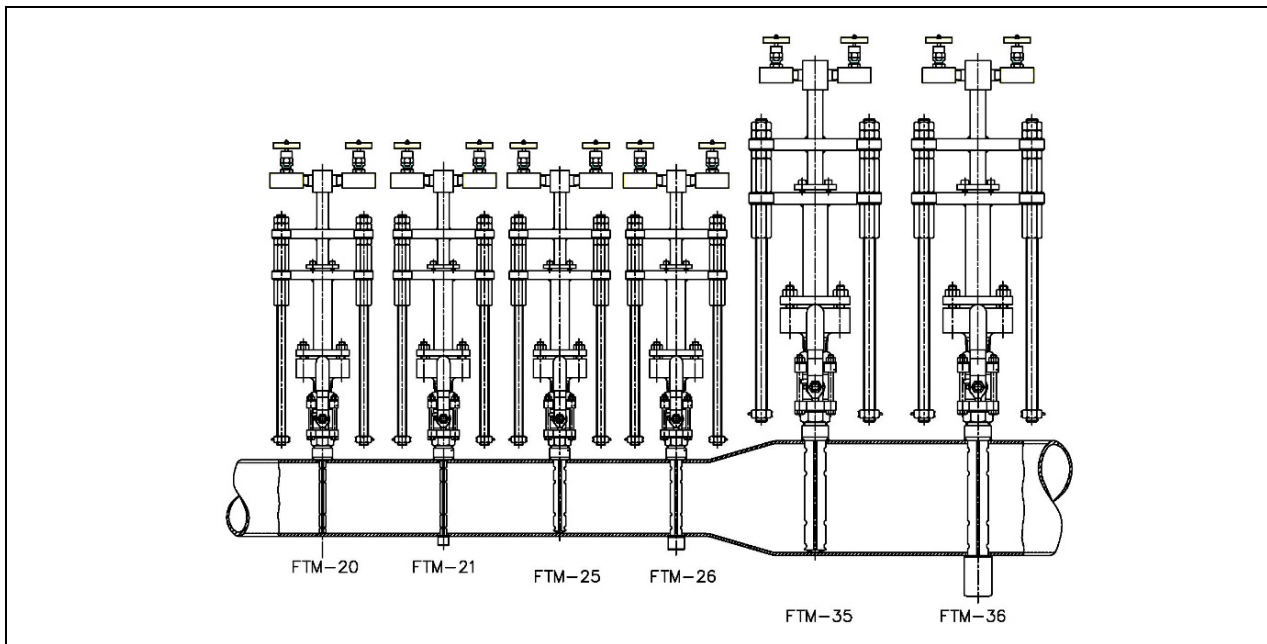
Itabar-Flow-Sensors

b) Drawing for FTM



c.) Order Data for Itabar® Series FTM-20/21/25/26/35/36

c.1) Sensor type:



Pipe diameter		Maximum allowable volumetric flow in m³/h					
		Sensor type					
inches	mm	FTM -20	FTM -21	FTM -25	FTM -26	FTM -35	FTM -36
1 1/2	DN 40	40	114	---	---	---	---
2	DN 50	59	161	---	---	---	---
2 1/4	DN 65	93	243	---	---	---	---
3	DN 80	130	328	---	---	---	---
4	DN 100	179	439	205	544	---	---
5	DN 125	238	570	281	719	---	---
6	DN 150	---	---	358	894	---	---
8	DN 200	---	---	515	1242	---	---
10	DN 250	---	---	687	1623	---	---
12	DN 300	---	---	872	2034	1757	4204
14	DN 350	---	---	1053	2433	2142	5067
16	DN 400	---	---	1226	2828	2532	5938
20	DN 500	---	---	1592	3627	3283	7611
24	DN 600	---	---	1949	4423	4052	9327
28	DN 700	---	---	2318	5237	4851	11106
32	DN 800	---	---	2704	6099	5667	12930
36	DN 900	---	---	---	7000	---	14790
40	DN 1000	---	---	---	7921	---	16614
48	DN 1200	---	---	---	9763	---	20450
56	DN 1400	---	---	---	---	---	24220
64	DN 1600	---	---	---	---	---	27987
72	DN 1800	---	---	---	---	---	31613
80	DN 2000	---	---	---	---	---	---

These values are for water of $\rho = 0,9982 \text{ kg/l}$ SGU and at a temperature $T = 20 \text{ }^{\circ}\text{C}$. To calculate volumetric or mass flow of fluids with other densities see chapter 6 „Specifications of DP Sensors with WINFLOW“.

Itabar-Flow-Sensors

d) Order Specifications Itabar-Flow-Sensors, Series FTM

d1) FTM-20/21

ITABAR®-FLOW-SENSOR for Liquids and Gases, Flo-Tap-Version, threaded connection and transport spindles	
Code	Description
1. Type:	
FTM-20	Sensor Ø12mm (FloTap version with screwed process connection and transport spindles) (max. PN40) for liquids and gases without end support
FTM-21	Sensor Ø12mm (FloTap version with screwed process connection and transport spindles) (max. PN40) for liquids and gases with end support
2. Pipe (duct) size: (ID/WT):	
DN040	DN 40 / 1-1/2"
DN050	DN 50 / 2"
DN065	DN 65 / 2-1/2"
DN080	DN 80 / 3"
DN100	DN 100 / 4"
Y9	others, please specify
3. Material sensor:	
V	1.4571 / 316Ti
Y	Special design
4. Welding Coupling	
000	without
001	material: C22.8 (similar A105)
003	material: 1.4571 / 316Ti
Y9	Special design
5. End support:	
00	without
01	material: C22.8 (similar A105)
03	material: 1.4571/316Ti
Y9	Special design
6. Isolation valve for the sensor profile:	
00	without
A01	ball valve PN16/40, mat.: CS, female 1" NPT, packing: PTFE
A02	ball valve PN16/40, mat.: CF8M (1.4408), female 1" NPT, packing: PTFE
Y9	Special design
7. Flanged packing gland:	
S	Flanged packing gland
Y9	Special design
8. Cage nipple:	
PC	material: P235GH (similar A106)
PV	material: 1.4571 / 316Ti
Y9	Special design
9. Packing material for the flanged and welded packing gland:	
1	packing material: PTFE, max. 200°C
2	packing material: graphite, max. 400°C
Y9	Special design
10. Gear / material of gear box:	
0	without
1	with gear / die-cast aluminium
2	with gear / stainless steel
Y	Special design

Please see next page

FTM-20/21 continuation	
Code	Description
11. Pipe insulation:	
KI	without
X	insulation in mm (min. 50mm)
Y	Special design
12. Pipe run/flow direction:	
HL	horizontal, left
HR	horizontal, right
VD	vertical, down
VU	vertical, upwards
Y9	Special design
13. Integrated temperature sensor:	
T0	without
TA	3-wire, RTD -50 bis 400°C, without Ex approval, Sensor diameter=Ø0.5mm
TB	sensor prepared for PT100, probe diameter = Ø0.5mm (customer provision)
TC	thermocouple type K with INT5334-A3B non-ex-version; 4...20 mA output
Y	Special design
13.1 Head transmitter for integrated RTD:	
0	without
2	4...20 mA / without Ex approval
3	4...20 mA + HART / without Ex approval
4	Profibus PA / without Ex approval
5	Foundation Fieldbus / without Ex approval
6	4...20 mA / ATEX Ex ia
7	4...20 mA + HART / ATEX Ex ia
8	Profibus PA / ATEX Ex ia
9	Foundation Fieldbus / ATEX Ex ia
Y	Special design
14. Differential pressure connection:	
A03	1 pair of nozzles, MNPT1/2" (remote version)
A03A03	2 pair of nozzles, MNPT1/2" (remote version)
A03A03A03	3 pair of nozzles, MNPT1/2" (remote version)
A04	1 pair of nozzles, MNPT1/4" (remote version)
A04A04	2 pair of nozzles, MNPT1/4" (remote version)
A04G	1 pair of nozzles, R1/4" male thread (remote version)
A04GA04G	2 pair of nozzles, R1/4" male thread (remote version)
A04S	1 pair of tube nozzle Ø6x4x1 (remote version)
R12	1 pair of pipe Ø12x1,5x50mm, material: 1.4571 (316Ti)
A12	1 pair Weld-on fitting Ermeto 12S, material: 316SS (remote version)
AS2	1 pair welding connection Ø21.3x3,2mm - welding end (remote version)
AS3	1 pair welding connection Ø21.3x6,3mm - welding end (remote version)
AS4	1 pair welding connection Ø24x4,0mm - welding end (remote version)
A06	IEC 61518; PTFE gasket
A16	IEC 61518; Viton gasket
A26	IEC 61518; PTFE gasket, cranked (for integrated temperature sensor or humid gas)
A36	IEC 61518; Viton gasket, cranked (for integrated temperature sensor or humid gas)
Y99	Special design

Please see next page

Itabar-Flow-Sensors

FTM-20/21 continuation	
Code	Description
15. Shut-off valve for remote version (initial shut-off):	
A00	without
A54G	1 pair ball valve PN40, mat.: CF8M (1.4408), female R1/4", packing: PTFE
A54GA54G	2 pair ball valve PN40, mat.: CF8M (1.4408), female R1/4", packing: PTFE
A56	1 pair ball valve PN40, mat.: CF8M (1.4408), female 1/2" NPT, packing: PTFE
A56A56	2 pair ball valve PN40, mat.: CF8M (1.4408), female 1/2" NPT, packing: PTFE
A56A56A56	3 pair ball valve PN40, mat.: CF8M (1.4408), female 1/2" NPT, packing: PTFE
A62	1 pair valve, PN400, housing: SS316/316L, female 1/2" NPT, packing: Graphite
A62A62	2 pair valve, PN400, housing: SS316/316L, female 1/2" NPT, packing: Graphite
A62A62A62	3 pair valve, PN400, housing: SS316/316L, female 1/2" NPT, packing: Graphite
A81	1 pair gate valve 800lbs. housing: A105, female 1/2" NPT, packing: Graphite
A82	1 pair gate valve 800lbs. housing: 316SS, female 1/2" NPT, packing: Graphite
AV1	1 pair valve, PN400, housing: C22.8 (A105), Ø21,3x6,3/Ø14,0x2,5 , packing: Graphite
AV2	1 pair valve, PN400, housing: 1.4571 (316Ti), Ø21,3x6,3/Ø14,0x2,5 , pckg: Graphite
AV3	valve, PN400, housing: 1.5415 (16Mo3), Ø21,3x6,3/Ø14,0x2,5 , packing: Graphite
Y99	Special design
15.1 First Shut-off accessories:	
0	without
E12	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø12mm, mat.: 316SS
E14	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø14mm, mat.: 316SS
Y99	Special design
15.2 Manifold for remote variant:	
0	without
MBC	3-way-manifold, 316/316L, PN420 DN5, In/Out: 1/2"-NPTF/IEC61518-A, pckg: PTFE
MBS	5-way-manifold, 316/316L PN420 DN5, In/Out: 1/2"-NPTF/IEC61518-A, pckg: PTFE
Y99	Special design
15.2.1 Mounting set for remote version (manifold):	
0	without
MBC	mounting set, CS zinc-plated, for 2" pipe mtg, incl. screws 7/16-UNF/ FPM90-O-Ring
MBS	mounting set, stainless steel, for 2" pipe mtg, incl. screws 7/16-UNF/ FPM90-O-Ring
Y99	Special design
15.2.2 Accessories for manifold:	
0	without
E12	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø12mm, mat.: 316SS
E14	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø14mm, mat.: 316SS
Y99	Special design
16. Valve block for compact variant:	
A000	without
A66M	3-way-manifold, IEC 61518, mat.: 1.4404 (316L), pckg: PTFE, screws M10
A66U	3-way-manifold, IEC 61518, mat.: 1.4404 (316L), pckg: PTFE, screws 7/16-UNF
A71M	5-way-manifold, IEC 61518, mat.: 1.4404 (316L), pckg: PTFE, screws M10
A71U	5-way-manifold, IEC 61518, mat.: 1.4404 (316L), pckg: PTFE, screws 7/16-UNF
Y999	Special design
17. Special design/pre-assembly:	
0	without
M01	mounting of dp transmitter (customer provision)
M03	mounting of p transmitter (customer provision) with oval flange, mat. st.st.
A4	cleaned from oil+grease certificate
A5	oxygen service certificate
A6	PWIS free certificate (PWIS = paint-wetting impairment substances)
Y99	Special design

D2) FTM-25/26

ITABAR®-FLOW-SENSOR for Liquids and Gases, Flo-Tap-Version, threaded connection and transport spindles	
Code	Description
1. Type:	
FTM-25	Sensor Ø25,4mm (FloTap version with screwed process connection and transport spindles) (max. PN40) for liquids and gases without end support
FTM-26	Sensor Ø25,4mm (FloTap version with screwed process connection and transport spindles) (max. PN40) for liquids and gases with end support
2. Pipe (duct) size: (ID/WT):	
DN100	DN 100 / 4"
DN125	DN 125 / 5"
DN150	DN 150 / 6"
DN200	DN 200 / 8"
DN250	DN 250 / 10"
DN300	DN 300 / 12"
DN350	DN 350 / 14"
DN400	DN 400 / 16"
DN450	DN 450 / 18"
DN500	DN 500 / 20"
DN600	DN 600 / 24"
DN700	DN 700 / 28"
DN800	DN 800 / 32"
DN900	DN 900 / 36"
DN1000	DN 1000 / 40"
DN1100	DN 1100 / 44"
DN1200	DN 1200 / 48"
Y9	others, please specify
3. Material sensor:	
S	1.4404 / 316L
V	1.4571 / 316Ti
Y	Special design
4. Welding Coupling	
000	without
001	material: C22.8 (similar A105)
002	material: 1.4404 / 316L
003	material: 1.4571 / 316Ti
Y9	Special design
5. End support:	
00	without
01	material: C22.8 (similar A105)
02	material: 1.4404 / 316L
03	material: 1.4571/316Ti
Y9	Special design

Please see next page

Itabar-Flow-Sensors

FTM-25/26 continuation	
Code	Description
6. Isolation valve for the sensor profile:	
00	without
A05	ball valve PN16/40, mat.: CS, female 1 1/2" NPT, packing: PTFE
A06	ball valve PN16/40, mat.: CF8M (1.4408), female 1 1/2" NPT, packing: PTFE
Y9	Special design
7. Flanged packing gland:	
S	1.4404 / 316L
V	1.4571 / 316Ti
Y9	Special design
8. Cage nipple:	
PC	material: P235GH (similar A106)
PS	material: 1.4404 / 316L
PV	material: 1.4571 / 316Ti
Y9	Special design
9. Packing material for the flanged and welded packing gland:	
1	packing material: PTFE, max. 200°C
2	packing material: graphite, max. 400°C
Y9	Special design
10. Gear / material of gearbox:	
0	without
1	with gear / die-cast aluminium
2	with gear / stainless steel
Y	Special design
11. Pipe insulation:	
KI	without
X	insulation in mm (min. 50mm)
Y	Special design
12. Pipe run/flow direction:	
HL	horizontal, left
HR	horizontal, right
VD	vertical, down
VU	vertical, upwards
Y9	Special design
13. Integrated temperature sensor:	
T0	without
TA	3-wire, RTD -50 bis 400°C, without Ex approval, Sensor diameter=Ø0.5mm
TB	sensor prepared for PT100, probe diameter = Ø0.5mm (customer provision)
TC	thermocouple type K with INT5334-A3B non-ex-version; 4...20 mA output
TX	sensor prepared for PT100, probe diameter = Ø3,0mm (customer provision)
Y	Special design

Please see next page

FTM-25/26 continuation	
Code	Description
13.1 Head transmitter for integrated RTD:	
0	without
2	4...20 mA / without Ex approval
3	4...20 mA + HART / without Ex approval
4	Profibus PA / without Ex approval
5	Foundation Fieldbus / without Ex approval
6	4...20 mA /ATEX Ex ia
7	4...20 mA + HART / ATEX Ex ia
8	Profibus PA / ATEX Ex ia
9	Foundation Fieldbus / ATEX Ex ia
Y	Special design
14. Differential pressure connection:	
A03	1 pair of nozzles, MNPT1/2" (remote version)
A03A03	2 pair of nozzles, MNPT1/2" (remote version)
A03A03A03	3 pair of nozzles, MNPT1/2" (remote version)
A04	1 pair of nozzles, MNPT1/4" (remote version)
A04A04	2 pair of nozzles, MNPT1/4" (remote version)
A04G	1 pair of nozzles, R1/4" male thread (remote version)
A04GA04G	2 pair of nozzles, R1/4" male thread (remote version)
A04S	1 pair of tube nozzle Ø6x4x1 (remote version)
R12	1 pair of pipe Ø12x1,5x50mm, material: 1.4571 (316Ti)
A12	1 pair Weld-on fitting Ermeto 12S, material: 316SS (remote version)
AS2	1 pair welding connection Ø21.3x3,2mm - welding end (remote version)
AS3	1 pair welding connection Ø21.3x6,3mm - welding end (remote version)
AS4	1 pair welding connection Ø24x4,0mm - welding end (remote version)
A06	IEC 61518; PTFE gasket
A16	IEC 61518; Viton gasket
A26	IEC 61518; PTFE gasket, cranked (for integrated temperature sensor or humid gas)
A36	IEC 61518; Viton gasket, cranked (for integrated temperature sensor or humid gas)
Y99	Special design
15. Shut-off valve for remote version (initial shut-off):	
A00	without
A54G	1 pair ball valve PN40, mat.: CF8M (1.4408), female R1/4", packing: PTFE
A54GA54G	2 pair ball valve PN40, mat.: CF8M (1.4408), female R1/4", packing: PTFE
A56	1 pair ball valve PN40, mat.: CF8M (1.4408), female 1/2" NPT, packing: PTFE
A56A56	2 pair ball valve PN40, mat.: CF8M (1.4408), female 1/2" NPT, packing: PTFE
A56A56A56	3 pair ball valve PN40, mat.: CF8M (1.4408), female 1/2" NPT, packing: PTFE
A62	1 pair valve, PN400, housing: SS316/316L, female 1/2" NPT, packing: Graphite
A62A62	2 pair valve, PN400, housing: SS316/316L, female 1/2" NPT, packing: Graphite
A62A62A62	3 pair valve, PN400, housing: SS316/316L, female 1/2" NPT, packing: Graphite
A81	1 pair gate valve 800lbs. housing: A105, female 1/2" NPT, packing: Graphite
A82	1 pair gate valve 800lbs. housing: 316SS, female 1/2" NPT, packing: Graphite
AV1	1 pair valve, PN400, housing: C22.8 (A105),Ø21,3x6,3/Ø14,0x2,5 , packing: Graphite
AV2	1 pair valve, PN400, housing: 1.4571 (316Ti),Ø21,3x6,3/Ø14,0x2,5 , pckg: Graphite
AV3	valve, PN400, housing: 1.5415 (16Mo3),Ø21,3x6,3/Ø14,0x2,5 , packing: Graphite
Y99	Special design

Please see next page

Itabar-Flow-Sensors

FTM-25/26 continuation	
Code	Description
15.1 First Shut-off accessories:	
0	without
E12	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø12mm, mat.: 316SS
E14	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø14mm, mat.: 316SS
Y99	Special design
15.2 Manifold for remote variant:	
0	without
A65P	3-way-manifold, 316/316L, PN420 DN5, In/Out: 1/2"-NPTF/IEC61518-A, pkg: PTFE
A70P	5-way-manifold, 316/316L PN420 DN5, In/Out: 1/2"-NPTF/IEC61518-A, pkg: PTFE
Y99	Special design
15.2.1 Mounting set for remote version (manifold):	
0	without
MBC	mounting set, CS zinc-plated, for 2" pipe mtg, incl. screws 7/16-UNF/ FPM90-O-Ring
MBS	mounting set, stainless steel, for 2" pipe mtg, incl. screws 7/16-UNF/ FPM90-O-Ring
Y99	Special design
15.2.2 Accessories for manifold:	
0	without
E12	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø12mm, mat.: 316SS
E14	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø14mm, mat.: 316SS
Y99	Special design
16. Valve block for compact variant:	
A000	without
A66M	3-way-manifold, IEC 61518, mat.: 1.4404 (316L), pkg: PTFE, screws M10
A66U	3-way-manifold, IEC 61518, mat.: 1.4404 (316L), pkg: PTFE, screws 7/16-UNF
A71M	5-way-manifold, IEC 61518, mat.: 1.4404 (316L), pkg: PTFE, screws M10
A71U	5-way-manifold, IEC 61518, mat.: 1.4404 (316L), pkg: PTFE, screws 7/16-UNF
Y999	Special design
17. Valve block for compact variant:	
0	without
M01	mounting of dp transmitter (customer provision)
M03	mounting of p transmitter (customer provision) with oval flange, mat. st.st.
A4	cleaned from oil+grease certificate
A5	oxygen service certificate
A6	PWIS free certificate (PWIS = paint-wetting impairment substances)
Y99	Special design

D3) FTM-35/36

ITABAR®-FLOW-SENSOR for Liquids and Gases, Flo-Tap-Version, threaded connection and transport spindles	
Code	Description
1. Type:	
FTM-35	Sensor Ø42mm (FloTap version with screwed process connection and transport spindles) (max. PN40) for liquids and gases without end support
FTM-36	Sensor Ø42mm (FloTap version with screwed process connection and transport spindles) (max. PN40) for liquids and gases with end support
2. Pipe (duct) size: (ID/WT):	
DN100	DN 100 / 4"
DN125	DN 125 / 5"
DN150	DN 150 / 6"
DN200	DN 200 / 8"
DN250	DN 250 / 10"
DN300	DN 300 / 12"
DN350	DN 350 / 14"
DN400	DN 400 / 16"
DN450	DN 450 / 18"
DN500	DN 500 / 20"
DN600	DN 600 / 24"
DN700	DN 700 / 28"
DN800	DN 800 / 32"
DN900	DN 900 / 36"
DN1000	DN 1000 / 40"
DN1100	DN 1100 / 44"
DN1200	DN 1200 / 48"
DN1400	DN 1400 / 56"
DN1600	DN 1600 / 64"
DN1800	DN 1800 / 72"
Y9	others, please specify
3. Material sensor:	
S	1.4404 / 316L
V	1.4571 / 316Ti
Y	Special design
4. Welding Coupling	
000	without
001	material: C22.8 (similar A105)
002	material: 1.4404 / 316L
003	material: 1.4571 / 316Ti
Y9	Special design
5. End support:	
00	without
01	material: C22.8 (similar A105)
02	material: 1.4404 / 316L
03	material: 1.4571/316Ti
Y9	Special design

Please see next page

Itabar-Flow-Sensors

FTM-35/36 continuation	
Code	Description
6. Isolation valve for the sensor profile:	
00	without
A09	ball valve PN16/150lbs, mat.: CS, female 2" NPT, packing: PTFE
A10	ball valve PN16/150lbs, mat.: 316, female 2" NPT, packing: PTFE
S09	gate valve PN16/150lbs, mat.: CS, female 2" NPT, packing: graphite
S10	gate valve PN16/150lbs, mat.: 316, female 2" NPT, packing: graphite
A11	ball valve PN40/300lbs, mat.: CS, female 2" NPT, packing: PTFE
A12	ball valve PN40/300lbs, mat.: 316, female 2" NPT, packing: PTFE
S11	gate valve PN40/300lbs, mat.: CS, female 2" NPT, packing: graphite
S12	gate valve PN40/300lbs, mat.: 316, female 2" NPT, packing: graphite
Y9	Special design
7. Flanged packing gland:	
S	1.4404 / 316L
V	1.4571 / 316Ti
Y9	Special design
8. Cage nipple:	
PC	material: P235GH (similar A106)
PS	material: 1.4404 / 316L
PV	material: 1.4571 / 316Ti
Y9	Special design
9. Packing material for the flanged and welded packing gland:	
1	packing material: PTFE, max. 200°C
2	packing material: graphite, max. 400°C
Y9	Special design
10. Gear / material of gearbox:	
0	without
1	with gear / die-cast aluminium
2	with gear / stainless steel
Y	Special design
11. Pipe insulation:	
KI	without
X	insulation in mm (min. 50mm)
Y	Special design
12. Pipe run/flow direction:	
HL	horizontal, left
HR	horizontal, right
VD	vertical, down
VU	vertical, upwards
Y9	Special design
13. Integrated temperature sensor:	
T0	without
TA	3-wire, RTD -50 bis 400°C, without Ex approval, Sensor diameter=Ø0.5mm
TB	sensor prepared for PT100, probe diameter = Ø0.5mm (customer provision)
TC	thermocouple type K with INT5334-A3B non-ex-version; 4...20 mA output
TX	sensor prepared for PT100, probe diameter = Ø3,0mm (customer provision)
Y	Special design

Please see next page

FTM-35/36 continuation	
Code	Description
13.1 Head transmitter for integrated RTD:	
0	without
2	4...20 mA / without Ex approval
3	4...20 mA + HART / without Ex approval
4	Profibus PA / without Ex approval
5	Foundation Fieldbus / without Ex approval
6	4...20 mA /ATEX Ex ia
7	4...20 mA + HART / ATEX Ex ia
8	Profibus PA / ATEX Ex ia
9	Foundation Fieldbus / ATEX Ex ia
Y	Special design
14. Differential pressure connection:	
A03	1 pair of nozzles, MNPT1/2" (remote version)
A03A03	2 pair of nozzles, MNPT1/2" (remote version)
A03A03A03	3 pair of nozzles, MNPT1/2" (remote version)
A04	1 pair of nozzles, MNPT1/4" (remote version)
A04A04	2 pair of nozzles, MNPT1/4" (remote version)
A04G	1 pair of nozzles, R1/4" male thread (remote version)
A04GA04G	2 pair of nozzles, R1/4" male thread (remote version)
A04S	1 pair of tube nozzle Ø6x4x1 (remote version)
R12	1 pair of pipe Ø12x1,5x50mm, material: 1.4571 (316Ti)
A12	1 pair Weld-on fitting Ermeto 12S, material: 316SS (remote version)
AS2	1 pair welding connection Ø21.3x3,2mm - welding end (remote version)
AS3	1 pair welding connection Ø21.3x6,3mm - welding end (remote version)
AS4	1 pair welding connection Ø24x4,0mm - welding end (remote version)
A06	IEC 61518; PTFE gasket
A16	IEC 61518; Viton gasket
A26	IEC 61518; PTFE gasket, cranked (for integrated temperature sensor or humid gas)
A36	IEC 61518; Viton gasket, cranked (for integrated temperature sensor or humid gas)
Y99	Special design
15. Shut-off valve for remote version (initial shut-off):	
A00	without
A54G	1 pair ball valve PN40, mat.: CF8M (1.4408), female R1/4", packing: PTFE
A54GA54G	2 pair ball valve PN40, mat.: CF8M (1.4408), female R1/4", packing: PTFE
A56	1 pair ball valve PN40, mat.: CF8M (1.4408), female 1/2" NPT, packing: PTFE
A56A56	2 pair ball valve PN40, mat.: CF8M (1.4408), female 1/2" NPT, packing: PTFE
A56A56A56	3 pair ball valve PN40, mat.: CF8M (1.4408), female 1/2" NPT, packing: PTFE
A62	1 pair valve, PN400, housing: SS316/316L, female 1/2" NPT, packing: Graphite
A62A62	2 pair valve, PN400, housing: SS316/316L, female 1/2" NPT, packing: Graphite
A62A62A62	3 pair valve, PN400, housing: SS316/316L, female 1/2" NPT, packing: Graphite
A81	1 pair gate valve 800lbs. housing: A105, female 1/2" NPT, packing: Graphite
A82	1 pair gate valve 800lbs. housing: 316SS, female 1/2" NPT, packing: Graphite
AV1	1 pair valve, PN400, housing: C22.8 (A105), Ø21,3x6,3/Ø14,0x2,5 , packing: Graphite
AV2	1 pair valve, PN400, housing: 1.4571 (316Ti), Ø21,3x6,3/Ø14,0x2,5 , pckg: Graphite
AV3	valve, PN400, housing: 1.5415 (16Mo3), Ø21,3x6,3/Ø14,0x2,5 , packing: Graphite
Y99	Special design

Please see next page

Itabar-Flow-Sensors

FTM-35/36 continuation	
Code	Description
15.1 First Shut-off accessories:	
0	without
E12	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø12mm, mat.: 316SS
E14	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø14mm, mat.: 316SS
Y99	Special design
15.2 Manifold for remote variant:	
0	without
A65P	3-way-manifold, 316/316L, PN420 DN5, In/Out: 1/2"-NPTF/IEC61518-A, pkg: PTFE
A70P	5-way-manifold, 316/316L PN420 DN5, In/Out: 1/2"-NPTF/IEC61518-A, pkg: PTFE
Y99	Special design
15.2.1 Mounting set for remote version (manifold):	
0	without
MBC	mounting set, CS zinc-plated, for 2" pipe mtg, incl. screws 7/16-UNF/ FPM90-O-Ring
MBS	mounting set, stainless steel, for 2" pipe mtg, incl. screws 7/16-UNF/ FPM90-O-Ring
Y99	Special design
15.2.2 Accessories for manifold:	
0	without
E12	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø12mm, mat.: 316SS
E14	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø14mm, mat.: 316SS
Y99	Special design
16. Valve block for compact variant:	
A000	without
A66M	3-way-manifold, IEC 61518, mat.: 1.4404 (316L), pkg: PTFE, screws M10
A66U	3-way-manifold, IEC 61518, mat.: 1.4404 (316L), pkg: PTFE, screws 7/16-UNF
A71M	5-way-manifold, IEC 61518, mat.: 1.4404 (316L), pkg: PTFE, screws M10
A71U	5-way-manifold, IEC 61518, mat.: 1.4404 (316L), pkg: PTFE, screws 7/16-UNF
Y999	Special design
17. Valve block for compact variant:	
0	without
M01	mounting of dp transmitter (customer provision)
M03	mounting of p transmitter (customer provision) with oval flange, mat. st.st.
A4	cleaned from oil+grease certificate
A5	oxygen service certificate
A6	PWIS free certificate (PWIS = paint-wetting impairment substances)
Y99	Special design

FTH

B.3.3 Flo-Tap-Version with flanged process connection and guide-rod-spindles

a) Description:

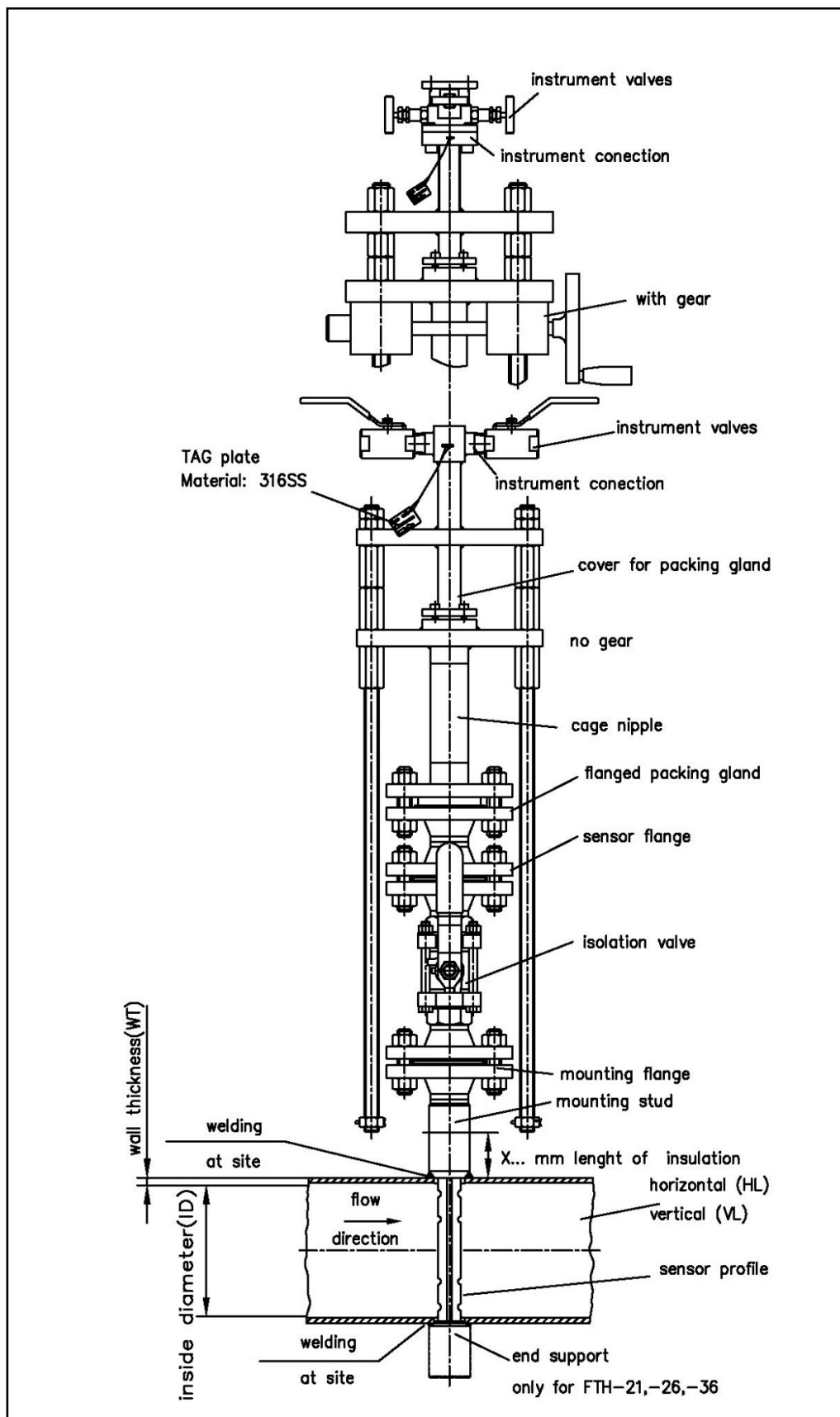
The FTH pitot tube sensor is designed to measure the volumetric flow of liquids and gases. The installation is done via a flanged connection. The flanged packing gland above the shut off valve ensures proper sealing of the sensor as well as a shortening of the leverage arm. The installation / removal of the sensor is facilitated via a pair of guiding spindles or a gear box with hand wheel (optional). The FTH sensor is designed for applications with a maximum operating pressure of 1470 psi (PN 100) and a maximum operating temperature of 752 °F (400°C).



Fig. 51 Itabar FTH-20 without gearbox

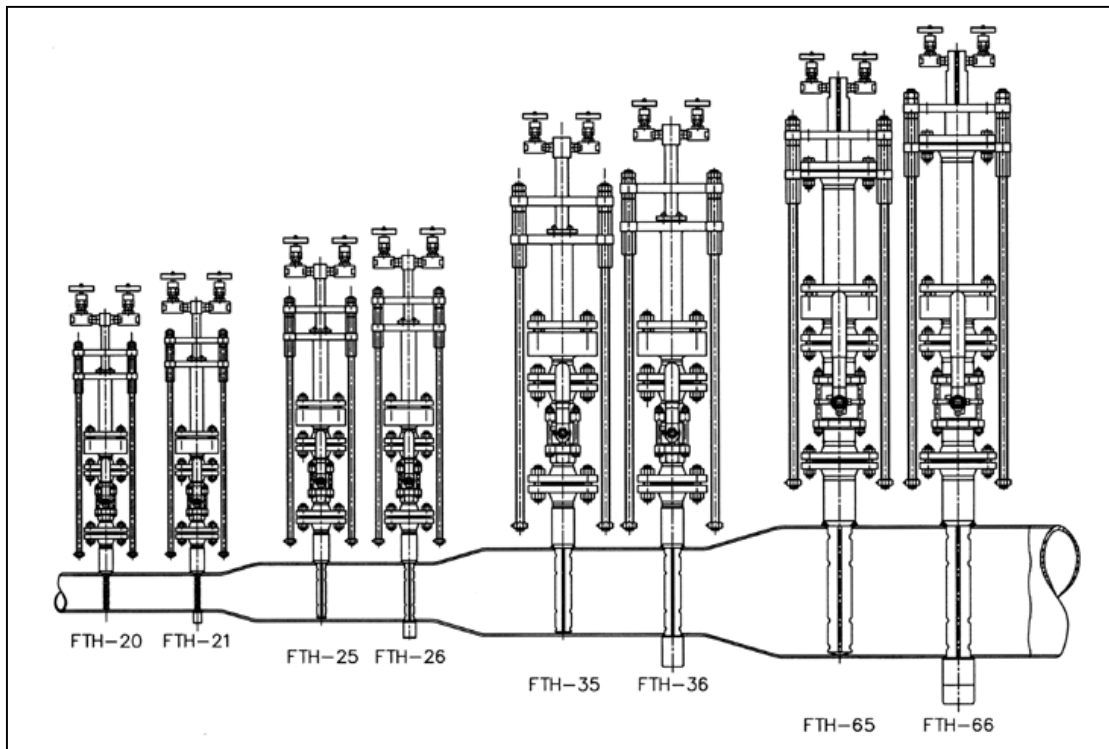
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b) Drawing for FTH



c.) Order Data for Itabar® Series FTH-20/21/25/26/35/36/65/66

c.1) Sensor type:



Pipe diameter inches mm		Maximum allowable volumetric flow in m³/h							
		Sensor type							
		FTH -20	FTH -21	FTH -25	FTH -26	FTH -35	FTH -36	FTH -65	FTH -66
1 1/2	DN 40	40	114	---	---	---	---	---	---
2	DN 50	59	161	---	---	---	---	---	---
2 1/4	DN 65	93	243	---	---	---	---	---	---
3	DN 80	130	328	---	---	---	---	---	---
4	DN 100	179	439	205	544	---	---	---	---
5	DN 125	238	570	281	719	---	---	---	---
6	DN 150	---	---	358	894	---	---	---	---
8	DN 200	---	---	515	1242	---	---	---	---
10	DN 250	---	---	687	1623	---	---	---	---
12	DN 300	---	---	872	2034	1757	4204	2818	5640
14	DN 350	---	---	1053	2433	2142	5067	3481	8110
16	DN 400	---	---	1226	2828	2532	5938	4138	9569
20	DN 500	---	---	1592	3627	3283	7611	5344	12233
24	DN 600	---	---	1949	4423	4052	9327	6794	15455
28	DN 700	---	---	2318	5237	4851	11106	8263	18723
32	DN 800	---	---	2704	6099	5667	12930	9615	21727
36	DN 900	---	---	---	7000	---	14790	---	24501
40	DN 1000	---	---	---	7921	---	16614	---	27182
48	DN 1200	---	---	---	9763	---	20450	---	32876
56	DN 1400	---	---	---	---	---	54184	---	39177
64	DN 1600	---	---	---	---	---	27987	---	46015
72	DN 1800	---	---	---	---	---	31613	---	52029
80	DN 2000	---	---	---	---	---	---	---	---

These values are for water of $\rho = 0,9982 \text{ kg/l}$ SGU and at a temperature $T = 20 \text{ }^{\circ}\text{C}$. To calculate volumetric or mass flow of fluids with other densities see chapter 6 „Specifications of DP Sensors with WINFLOW“.

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d) Order Specifications Itabar-Flow-Sensors, Series FTH

d1) FTH-20/21

ITABAR®-FLOW-SENSOR for Liquids and Gases, Flo-Tap-Version, flanged connection and transport spindles	
Code	Description
1. Type:	
FTH-20	Sensor Ø12mm (FloTap version with flanged process connection and transport spindles) (max. PN40) for liquids and gases without end support
FTH-21	Sensor Ø12mm (FloTap version with flanged process connection and transport spindles) (max. PN40) for liquids and gases with end support
2. Pipe (duct) size: (ID/WT):	
DN040	DN 40 / 1-1/2"
DN050	DN 50 / 2"
DN065	DN 65 / 2-1/2"
DN080	DN 80 / 3"
DN100	DN 100 / 4"
Y9	others, please specify
3. Material sensor / process connection:	
S	1.4404 / 316L
V	1.4571 / 316Ti
X	1.4462 / ASTM F51 / Duplex
K	1.4539 / AISI 904L
M	2.4360 / Alloy 400 / N04400
H	2.4610 / Alloy C4 / N06455
I	2.4858 / Alloy 825 / N08825
Y	others, please specify
4. Process connection	
00	without
FA	flange connection
Y	others, please specify
4.1 Standard:	
E	EN 1092-1
A	ASME B 16.5
D	DIN (according to type & pressure rating)
Y	others, please specify
4.2 Nominal size:	
A23	DN25
AGG	1"
Y9	others, please specify
4.3 Pressure class:	
C	PN16
D	PN40
E	PN63
F	PN100
K	150 lbs.
L	300 lbs.
M	600 lbs.
Y9	others, please specify

Please see next page

FTH-20/21 continuation	
Code	Description
4.4 Flange face process connection flange:	
E0	EN 1092-1 Form A (without sealing strip; Ra 3.2-12.5µm)
E1	EN 1092-1 Form B1 (raised sealing strip; Ra 3,2-12,5µm)
E2	EN 1092-1 Form B2 (raised sealing strip; Ra 0,8-3,2µm)
E3	EN 1092-1 Form C (tongue; Ra 0,8-3,2µm)
E4	EN 1092-1 Form D (groove; Ra 0,8-3,2µm)
A1	ASME B 16.5 Raised Face (RF)
A2	ASME B 16.5 Raised Face Smooth Finish (RFSF)
A3	ASME B 16.5 Flat Face (FF)
A4	ASME B 16.5 Ring-Type Joint (RTJ)
A5	ASME B 16.5 Tongue (ASME)
A6	ASME B 16.5 Groove (ASME)
D1	DIN Form A (without special demand)
D2	DIN Form B (raised sealing strip ; Rz = 160µm)
D3	DIN Form C (raised sealing strip ; Rz = 160µm)
D4	DIN Form D (raised sealing strip ; Rz = 40µm)
D5	DIN Form E (raised sealing strip ; Rz = 16µm)
D6	DIN Form F (tongue acc. DIN 2512)
D7	DIN Form N (groove acc. DIN 2512)
Y9	others, please specify
4.5 Gasket:	
0	without
A	material: PTFE, thickness: 2 mm, max. 150°C (302°F)
B	Fibre-reinforced flat gasket; Klingersil C4400, thickness: 2 mm; max. 200°C (392°F)
C	Sp. wnd gasket w/IR(316)&AR(CS)filling graphite;thickn.:4.5mm;max.450°C(842°F)
D	Sp. wnd gasket w/IR(316SS)&AR(316SS)filling graph.;thickn.:4.5mm;max.450°C (842°F)
RO	Ring-Joint Seal Type R-Oval ASME B16.20
Y9	others, please specify
4.6 Bolts/nuts:	
0	without
1	DIN931(ISO 4014)hex-head screw w/one nut; material: 5.6/5.2 (carbon steel zinc-plated)
2	DIN931 (ISO 4014) hex-head screw with one nut; material: A2-70 (stainless steel)
3	DIN 2510 Form L Material: 1.1181 / CK35
4	DIN 2510 Form L Material: 1.4301 / A2-70
5	ASME B16.5 Material: A193 Gr. B7 / A194 Gr. 2H (galvanised)
6	ASME B16.5 Material: A193 Gr. B8 Cl.1 / A194 Gr. 8
Y9	others, please specify
5. Design mounting stud:	
0	without (provided by others / customer /)
R	mounting stud with flange (standard)
W0	weldolet assembly, stud with flange
Y9	others, please specify

ase see next page

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FTH-20/21 continuation	
Code	Description
5.1 Material mounting stud:	
C	P250GH / A105
S	1.4404 / 316L
V	1.4571 / 316Ti
X	1.4462 / ASTM F51 / Duplex
K	1.4539 / AISI 904L
M	2.4360 / Alloy 400 / N04400
H	2.4610 / Alloy C4 / N06455
I	2.4858 / Alloy 825 / N08825
Y	others, please specify
5.2 standard:	
E	EN 1092-1
A	ASME B 16.5
D	DIN (according to type & pressure rating)
Y	others, please specify
5.3 nominal size:	
A23	DN25
AGG	1"
Y9	others, please specify
5.4 Pressure class:	
C	PN16
D	PN40
E	PN63
F	PN100
K	150 lbs.
L	300 lbs.
M	600 lbs.
Y9	others, please specify
5.5 Flange face mounting stud flange:	
E0	EN 1092-1 Form A (without sealing strip; Ra 3.2-12.5µm)
E1	EN 1092-1 Form B1 (raised sealing strip; Ra 3,2-12,5µm)
E2	EN 1092-1 Form B2 (raised sealing strip; Ra 0,8-3,2µm)
E3	EN 1092-1 Form C (tongue; Ra 0,8-3,2µm)
E4	EN 1092-1 Form D (groove; Ra 0,8-3,2µm)
A1	ASME B 16.5 Raised Face (RF)
A2	ASME B 16.5 Raised Face Smooth Finish (RFSF)
A3	ASME B 16.5 Flat Face (FF)
A4	ASME B 16.5 Ring-Type Joint (RTJ)
A5	ASME B 16.5 Tongue (ASME)
A6	ASME B 16.5 Groove (ASME)
D1	DIN Form A (without special demand)
D2	DIN Form B (raised sealing strip ; Rz = 160µm)
D3	DIN Form C (raised sealing strip ; Rz = 160µm)
D4	DIN Form D (raised sealing strip ; Rz = 40µm)
D5	DIN Form E (raised sealing strip ; Rz = 16µm)
D6	DIN Form F (tongue acc. DIN 2512)
D7	DIN Form N (groove acc. DIN 2512)
Y9	others, please specify

Please see next page

FTH-20/21 continuation	
Code	Description
6. End support:	
0	without
C	material: C22.8 (similar A105)
S	material: 1.4404 / 316L
V	material: 1.4571 / 316Ti
X	material: 1.4462 / ASTM F51 / Duplex
K	material: 1.4539 / AISI 904L
M	material: 2.4360 / Alloy 400 / N04400
H	material: 2.4610 / Alloy C4 / N06455
I	material: 2.4858 / Alloy 825 / N08825
Y	others, please specify
7. Isolation valve for the sensor profile (Flange face as mounting stud flange):	
00	without
MF01	ball valve flanged DN25 PN16, mat.: C.S., packing: PTFE
MF02	ball valve flanged DN25 PN16, mat.: CF8M (1.4408), packing: PTFE
MF03	ball valve flanged DN25 PN40, mat.: C.S., packing: PTFE
MF04	ball valve flanged DN25 PN40, mat.: CF8M (1.4408), packing: PTFE
MF05	ball valve flanged DN25 PN40, mat.: 1.4462 / ASTM F51 / Duplex, packing: PTFE
MF06	ball valve flanged DN25 PN40, mat.: 2.4360 / Alloy 400 / N04400, packing: PTFE
MF07	ball valve flanged DN25 PN40, mat.: 2.4610 / Alloy C4 / N06455, packing: PTFE
MF08	ball valve flanged DN25 PN40, mat.: 1.4876 / Incoloy 800 packing: PTFE
MF09	ball valve flanged DN25 PN40, mat.: 2.4816 / Inconel 600, packing: PTFE
MS01	gate valve flanged DN25 PN100, mat.: C.S., packing: Graphite
MS02	gate valve flanged DN25 PN100, mat.: stainless steel, packing: Graphite
AF01	ball valve flanged 1" ANSI 150 lbs, mat.: C.S., packing: PTFE
AF02	ball valve flanged 1" ANSI 150 lbs, mat.: CF8M (1.4408), packing: PTFE
AF03	ball valve flanged 1" ANSI 300 lbs, mat.: C.S., packing: PTFE
AF04	ball valve flanged 1" ANSI 300 lbs, mat.: CF8M (1.4408), packing: PTFE
AF05	ball valve flanged 1" ANSI 300 lbs, mat.: 1.4462 / ASTM F51 / Duplex, packing: PTFE
AF06	ball valve flanged 1" ANSI 300 lbs, mat.: 2.4360 / Alloy 400 / N04400, packing: PTFE
AF07	ball valve flanged 1" ANSI 300 lbs, mat.: 2.4610 / Alloy C4 / N06455, packing: PTFE
AF08	ball valve flanged 1" ANSI 300 lbs, mat.: 1.4876 / Incoloy 800 packing: PTFE
AF09	ball valve flanged 1" ANSI 300 lbs, mat.: 2.4816 / Inconel 600, packing: PTFE
AS01	gate valve flanged 1" ANSI 600 lbs, mat.: C.S., packing: Graphite
AS02	gate valve flanged 1" ANSI 600 lbs, mat.: stainless steel, packing: Graphite
Y99	others, please specify
8. Flanged packing gland:	
S	material: 1.4404 / 316L
V	material: 1.4571 / 316Ti
X	material: 1.4462 / ASTM F51 / Duplex
K	material: 1.4539 / AISI 904L
M	material: 2.4360 / Alloy 400 / N04400
H	material: 2.4610 / Alloy C4 / N06455
I	material: 2.4858 / Alloy 825 / N08825
Y	others, please specify

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FTH-20/21 continuation	
Code	Description
9. Cage nipple:	
PC	material: P235GH (similar A106)
PS	material: 1.4404 / 316L
PV	material: 1.4571 / 316Ti
PX	material: 1.4462 / ASTM F51 / Duplex
PK	material: 1.4539 / AISI 904L
PM	material: 2.4360 / Alloy 400 / N04400
PH	material: 2.4610 / Alloy C4 / N06455
PI	material: 2.4858 / Alloy 825 / N08825
Y9	others, please specify
10. Packing material for the flanged and welded packing gland:	
1	packing material: PTFE, max. 200°C
2	packing material: graphite, max. 400°C
Y9	Special design
11. Gear / material of gear box:	
0	without
1	with gear / die-cast aluminium
2	with gear / stainless steel
Y	Special design
12. Pipe insulation:	
KI	without
X	insulation in mm (min. 50mm)
Y	others, please specify
13. Pipe run/flow direction:	
HL	horizontal, left
HR	horizontal, right
VD	vertical, down
VU	vertical, upwards
Y9	others, please specify
14. Integrated temperature sensor:	
T0	without
TA	3-wire, RTD -50 bis 400°C, without Ex approval, Sensor diameter=Ø0.5mm
TB	sensor prepared for PT100, probe diameter = Ø0.5mm (customer provision)
TC	thermocouple type K with INT5334-A3B non-ex-version; 4...20 mA output
Y	others, please specify
14.1 Head transmitter for integrated RTD:	
0	without
2	4...20 mA / without Ex approval
3	4...20 mA + HART / without Ex approval
4	Profibus PA / without Ex approval
5	Foundation Fieldbus / without Ex approval
6	4...20 mA / ATEX Ex ia
7	4...20 mA + HART / ATEX Ex ia
8	Profibus PA / ATEX Ex ia
9	Foundation Fieldbus / ATEX Ex ia
Y	others, please specify

Please see next page

FTH-20/21 continuation	
Code	Description
15. Differential pressure connection:	
A03	1 pair of nozzles, MNPT 1/2" (remote version)
A03A03	2 pair of nozzles, MNPT 1/2" (remote version)
A03A03A03	3 pair of nozzles, MNPT 1/2" (remote version)
A04	1 pair of nozzles, MNPT 1/4" (remote version)
A04A04	2 pair of nozzles, MNPT 1/4" (remote version)
A04G	1 pair of nozzles, R1/4" male thread (remote version)
A04GA04G	2 pair of nozzles, R1/4" male thread (remote version)
A04S	1 pair of tube nozzle Ø6x4x1 (remote version)
R12	1 pair of pipe Ø12x1,5x50mm, material: 1.4571 (316Ti)
A12	1 pair Weld-on fitting Ermeto 12S, material: 316SS (remote version)
AS2	1 pair welding connection Ø21.3x3,2mm - welding end (remote version)
AS3	1 pair welding connection Ø21.3x6,3mm - welding end (remote version)
AS4	1 pair welding connection Ø24x4,0mm - welding end (remote version)
A06	IEC 61518; PTFE gasket
A16	IEC 61518; Viton gasket
A26	IEC 61518; PTFE gasket, cranked (for integrated temperature sensor or humid gas)
A36	IEC 61518; Viton gasket, cranked (for integrated temperature sensor or humid gas)
Y99	Special design
16. Shut-off valve for remote version (initial shut-off):	
A00	without
A54G	1 pair ball valve PN40, mat.: CF8M (1.4408), female R1/4", packing: PTFE
A54GA54G	2 pair ball valve PN40, mat.: CF8M (1.4408), female R1/4", packing: PTFE
A56	1 pair ball valve PN40, mat.: CF8M (1.4408), female 1/2" NPT, packing: PTFE
A56A56	2 pair ball valve PN40, mat.: CF8M (1.4408), female 1/2" NPT, packing: PTFE
A56A56A56	3 pair ball valve PN40, mat.: CF8M (1.4408), female 1/2" NPT, packing: PTFE
A62	1 pair valve, PN400, housing: SS316/316L, female 1/2" NPT, packing: Graphite
A62A62	2 pair valve, PN400, housing: SS316/316L, female 1/2" NPT, packing: Graphite
A62A62A62	3 pair valve, PN400, housing: SS316/316L, female 1/2" NPT, packing: Graphite
A81	1 pair gate valve 800lbs. housing: A105, female 1/2" NPT, packing: Graphite
A82	1 pair gate valve 800lbs. housing: 316SS, female 1/2" NPT, packing: Graphite
AV1	1 pair valve, PN400, housing: C22.8 (A105), Ø21,3x6,3/Ø14,0x2,5, packing: Graphite
AV2	1 pair valve, PN400, hsg: 1.4571 (316Ti), Ø21,3x6,3/Ø14,0x2,5, packing: Graphite
AV3	valve, PN400, housing: 1.5415 (16Mo3), Ø21,3x6,3/Ø14,0x2,5, packing: Graphite
Y99	others, please specify
16.1 First Shut-off accessories:	
0	without
E12	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø12mm, mat.: 316SS
E14	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø14mm, mat.: 316SS
Y99	others, please specify
16.2 Manifold for remote version:	
0	without
A65P	3-way-manifold, 316/316L, PN420 DN5, In/Out: 1/2"-NPTF/IEC61518-A, pkg: PTFE
A70P	5-way-manifold, 316/316L PN420 DN5, In/Out: 1/2"-NPTF/IEC61518-A, pkg: PTFE
Y99	others, please specify
16.2.1 Mounting set for remote version (manifold):	
0	without
MBC	mtg set, CS zinc-plated, for 2" pipe mounting, incl. screws 7/16-UNF/ FPM90-O-Ring
MBS	mtg set, stainless steel, for 2" pipe mounting, incl. screws 7/16-UNF/ FPM90-O-Ring
Y99	others, please specify

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FTH-20/21 continuation	
Code	Description
16.2.2 Accessories for manifold:	
0	without
E12	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø12mm, mat.: 316SS
E14	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø14mm, mat.: 316SS
Y99	others, please specify
17. Valve block for compact version:	
A000	without
A66M	3-way-manifold, IEC 61518, material: 1.4404 (316L), packing: PTFE, screws M10
A66U	3-way-manifold, IEC 61518, material: 1.4404 (316L), pckg: PTFE, screws 7/16-UNF
A71M	5-way-manifold, IEC 61518, material: 1.4404 (316L), packing: PTFE, screws M10
A71U	5-way-manifold, IEC 61518, material: 1.4404 (316L), pckg: PTFE, screws 7/16-UNF
Y999	others, please specify
18. Special design/pre-assembly:	
0	without
M01	mounting of dp transmitter (customer provision)
M03	mounting of p transmitter (customer provision) with oval flange, mat. st.st.
A4	cleaned from oil+grease certificate
A5	oxygen service certificate
A6	PWIS free certificate (PWIS = paint-wetting impairment substances)
Y99	others, please specify

d2) FTH-25/26

ITABAR®-FLOW-SENSOR for Liquids and Gases, Flo-Tap-Version, flanged connection and transport spindles	
Code	Description
1. Type:	
FTH-25	Sensor Ø25,4mm (FloTap version with flanged process connection and transport spindles) (max. PN100) for liquids and gases without end support
FTH-26	Sensor Ø25,4mm (FloTap version with flanged process connection and transport spindles) (max. PN100) for liquids and gases with end support
2. Pipe (duct) size: (ID/WT):	
DN100	DN 100 / 4"
DN125	DN 125 / 5"
DN150	DN 150 / 6"
DN200	DN 200 / 8"
DN250	DN 250 / 10"
DN300	DN 300 / 12"
DN350	DN 350 / 14"
DN400	DN 400 / 16"
DN450	DN 450 / 18"
DN500	DN 500 / 20"
DN600	DN 600 / 24"
DN700	DN 700 / 28"
DN800	DN 800 / 32"
DN900	DN 900 / 36"
DN1000	DN 1000 / 40"
DN1100	DN 1100 / 44"
DN1200	DN 1200 / 48"
Y9	others, please specify
3. Material sensor / process connection:	
S	1.4404 / 316L
V	1.4571 / 316Ti
X	1.4462 / ASTM F51 / Duplex
K	1.4539 / AISI 904L
M	2.4360 / Alloy 400 / N04400
H	2.4610 / Alloy C4 / N06455
I	2.4858 / Alloy 825 / N08825
Y	others, please specify
4. Process connection	
00	without
FA	flange connection
Y	others, please specify
4.1 Standard:	
E	EN 1092-1
A	ASME B 16.5
D	DIN (according to type & pressure rating)
Y	others, please specify

Please see next page

Itabar-Flow-Sensors

FTH-25/26 continuation	
Code	Description
4.2 Nominal size:	
32	DN32
40	DN40
12	1-1/2"
Y9	others, please specify
4.3 Pressure class:	
C	PN16
D	PN40
E	PN63
F	PN100
K	150 lbs.
L	300 lbs.
M	600 lbs.
Y9	others, please specify
4.4 Flange face process connection flange:	
E0	EN 1092-1 Form A (without sealing strip; Ra 3,2-12,5µm)
E1	EN 1092-1 Form B1 (raised sealing strip; Ra 3,2-12,5µm)
E2	EN 1092-1 Form B2 (raised sealing strip; Ra 0,8-3,2µm)
E3	EN 1092-1 Form C (tongue; Ra 0,8-3,2µm)
E4	EN 1092-1 Form D (groove; Ra 0,8-3,2µm)
A1	ASME B 16.5 Raised Face (RF)
A2	ASME B 16.5 Raised Face Smooth Finish (RFSF)
A3	ASME B 16.5 Flat Face (FF)
A4	ASME B 16.5 Ring-Type Joint (RTJ)
A5	ASME B 16.5 Tongue (ASME)
A6	ASME B 16.5 Groove (ASME)
D1	DIN Form A (without special demand)
D2	DIN Form B (raised sealing strip ; Rz = 160µm)
D3	DIN Form C (raised sealing strip ; Rz = 160µm)
D4	DIN Form D (raised sealing strip ; Rz = 40µm)
D5	DIN Form E (raised sealing strip ; Rz = 16µm)
D6	DIN Form F (tongue acc. DIN 2512)
D7	DIN Form N (groove acc. DIN 2512)
Y9	others, please specify
4.5 Gasket:	
0	without
A	material: PTFE, thickness: 2 mm, max. 150°C (302°F)
B	Fibre-reinforced flat gasket; Klingersil C4400, thickness: 2 mm; max. 200°C (392°F)
C	Sp. wnd gasket w/IR(316)&AR(CS)filling graphite;thickn.:4.5mm;max.450°C(842°F)
D	Sp. wnd gasket w/IR(316SS)&AR(316SS)filling graph.;thickn.:4.5mm;max.450°C (842°F)
RO	Ring-Joint Seal Type R-Oval ASME B16.20
Y9	others, please specify

ase see next page

FTH-25/26 continuation	
Code	Description
4.6 Bolts/nuts:	
0	without
1	DIN931(ISO 4014)hex-head screw w/one nut; material: 5.6/5.2 (carbon steel zinc-plated)
2	DIN931 (ISO 4014) hex-head screw with one nut; material: A2-70 (stainless steel)
3	DIN 2510 Form L Material: 1.1181 / CK35
4	DIN 2510 Form L Material: 1.4301 / A2-70
5	ASME B16.5 Material: A193 Gr. B7 / A194 Gr. 2H (galvanised)
6	ASME B16.5 Material: A193 Gr. B8 Cl.1 / A194 Gr. 8
Y9	others, please specify
5. Design mounting stud:	
0	without (provided by others / customer /)
R	mounting stud with flange (standard)
W0	weldolet assembly, stud with flange
Y9	others, please specify
5.1 Material mounting stud:	
C	P250GH / A105
S	1.4404 / 316L
V	1.4571 / 316Ti
X	1.4462 / ASTM F51 / Duplex
K	1.4539 / AISI 904L
M	2.4360 / Alloy 400 / N04400
H	2.4610 / Alloy C4 / N06455
I	2.4858 / Alloy 825 / N08825
Y	others, please specify
5.2 standard:	
E	EN 1092-1
A	ASME B 16.5
D	DIN (according to type & pressure rating)
Y	others, please specify
5.3 nominal size:	
32	DN32
40	DN40
12	1-1/2"
Y9	others, please specify
5.4 Pressure class:	
C	PN16
D	PN40
E	PN63
F	PN100
K	150 lbs.
L	300 lbs.
M	600 lbs.
Y9	others, please specify

Please see next page

Itabar-Flow-Sensors

FTH-25/26 continuation	
Code	Description
5.5 Flange face mounting stud flange:	
E0	EN 1092-1 Form A (without sealing strip; Ra 3.2-12.5µm)
E1	EN 1092-1 Form B1 (raised sealing strip; Ra 3,2-12,5µm)
E2	EN 1092-1 Form B2 (raised sealing strip; Ra 0,8-3,2µm)
E3	EN 1092-1 Form C (tongue; Ra 0,8-3,2µm)
E4	EN 1092-1 Form D (groove; Ra 0,8-3,2µm)
A1	ASME B 16.5 Raised Face (RF)
A2	ASME B 16.5 Raised Face Smooth Finish (RFSF)
A3	ASME B 16.5 Flat Face (FF)
A4	ASME B 16.5 Ring-Type Joint (RTJ)
A5	ASME B 16.5 Tongue (ASME)
A6	ASME B 16.5 Groove (ASME)
D1	DIN Form A (without special demand)
D2	DIN Form B (raised sealing strip ; Rz = 160µm)
D3	DIN Form C (raised sealing strip ; Rz = 160µm)
D4	DIN Form D (raised sealing strip ; Rz = 40µm)
D5	DIN Form E (raised sealing strip ; Rz = 16µm)
D6	DIN Form F (tongue acc. DIN 2512)
D7	DIN Form N (groove acc. DIN 2512)
Y9	others, please specify
6. End support:	
0	without
C	material: C22.8 (similar A105)
S	material: 1.4404 / 316L
V	material: 1.4571 / 316Ti
X	material: 1.4462 / ASTM F51 / Duplex
K	material: 1.4539 / AISI 904L
M	material: 2.4360 / Alloy 400 / N04400
H	material: 2.4610 / Alloy C4 / N06455
I	material: 2.4858 / Alloy 825 / N08825
Y	others, please specify

Please see next page

FTH-25/26 continuation	
Code	Description
7. Isolation valve for the sensor profile (Flange face as mounting stud flange):	
00	without
MF01	ball valve flanged DN25 PN16, mat.: C.S., packing: PTFE
MF02	ball valve flanged DN25 PN16, mat.: CF8M (1.4408), packing: PTFE
MF03	ball valve flanged DN25 PN40, mat.: C.S., packing: PTFE
MF04	ball valve flanged DN25 PN40, mat.: CF8M (1.4408), packing: PTFE
MF05	ball valve flanged DN25 PN40, mat.: 1.4462 / ASTM F51 / Duplex, packing: PTFE
MF06	ball valve flanged DN25 PN40, mat.: 2.4360 / Alloy 400 / N04400, packing: PTFE
MF07	ball valve flanged DN25 PN40, mat.: 2.4610 / Alloy C4 / N06455, packing: PTFE
MF08	ball valve flanged DN25 PN40, mat.: 1.4876 / Incoloy 800 packing: PTFE
MF09	ball valve flanged DN25 PN40, mat.: 2.4816 / Inconel 600, packing: PTFE
MS01	gate valve flanged DN25 PN100, mat.: C.S., packing: Graphite
MS02	gate valve flanged DN25 PN100, mat.: stainless steel, packing: Graphite
AF01	ball valve flanged 1" ANSI 150 lbs, mat.: C.S., packing: PTFE
AF02	ball valve flanged 1" ANSI 150 lbs, mat.: CF8M (1.4408), packing: PTFE
AF03	ball valve flanged 1" ANSI 300 lbs, mat.: C.S., packing: PTFE
AF04	ball valve flanged 1" ANSI 300 lbs, mat.: CF8M (1.4408), packing: PTFE
AF05	ball valve flanged 1" ANSI 300 lbs, mat.: 1.4462 / ASTM F51 / Duplex, packing: PTFE
AF06	ball valve flanged 1" ANSI 300 lbs, mat.: 2.4360 / Alloy 400 / N04400, packing: PTFE
AF07	ball valve flanged 1" ANSI 300 lbs, mat.: 2.4610 / Alloy C4 / N06455, packing: PTFE
AF08	ball valve flanged 1" ANSI 300 lbs, mat.: 1.4876 / Incoloy 800 packing: PTFE
AF09	ball valve flanged 1" ANSI 300 lbs, mat.: 2.4816 / Inconel 600, packing: PTFE
AS01	gate valve flanged 1" ANSI 600 lbs, mat.: C.S., packing: Graphite
AS02	gate valve flanged 1" ANSI 600 lbs, mat.: stainless steel, packing: Graphite
Y99	others, please specify
8. Flanged packing gland:	
S	material: 1.4404 / 316L
V	material: 1.4571 / 316Ti
X	material: 1.4462 / ASTM F51 / Duplex
K	material: 1.4539 / AISI 904L
M	material: 2.4360 / Alloy 400 / N04400
H	material: 2.4610 / Alloy C4 / N06455
I	material: 2.4858 / Alloy 825 / N08825
Y	others, please specify
9. Cage nipple:	
PC	material: P235GH (similar A106)
PS	material: 1.4404 / 316L
PV	material: 1.4571 / 316Ti
PX	material: 1.4462 / ASTM F51 / Duplex
PK	material: 1.4539 / AISI 904L
PM	material: 2.4360 / Alloy 400 / N04400
PH	material: 2.4610 / Alloy C4 / N06455
PI	material: 2.4858 / Alloy 825 / N08825
Y9	others, please specify

Please see next page

Itabar-Flow-Sensors

FTH-25/26 continuation	
Code	Description
10. Packing material for the flanged and welded packing gland:	
1	packing material: PTFE, max. 200°C
2	packing material: graphite, max. 400°C
Y9	Special design
11. Gear / material of gear box:	
0	without
1	with gear / die-cast aluminium
2	with gear / stainless steel
Y	Special design
12. Pipe insulation:	
KI	without
X	insulation in mm (min. 50mm)
Y	others, please specify
13. Pipe run/flow direction:	
HL	horizontal, left
HR	horizontal, right
VD	vertical, down
VU	vertical, upwards
Y9	others, please specify
14. Integrated temperature sensor:	
T0	without
TA	3-wire, RTD -50 bis 400°C, without Ex approval, Sensor diameter=Ø0.5mm
TB	3-wire, RTD -50 bis 400°C, Ex approval, Sensor diameter=Ø3,0mm
TC	thermocouple type K with INT5334-A3B non-ex-version; 4...20 mA output
TX	sensor prepared for PT100, probe diameter = Ø3,0mm (customer provision)
Y	others, please specify
14.1 Head transmitter for integrated RTD:	
0	without
2	4...20 mA / without Ex approval
3	4...20 mA + HART / without Ex approval
4	Profibus PA / without Ex approval
5	Foundation Fieldbus / without Ex approval
6	4...20 mA / ATEX Ex ia
7	4...20 mA + HART / ATEX Ex ia
8	Profibus PA / ATEX Ex ia
9	Foundation Fieldbus / ATEX Ex ia
Y	others, please specify
14.1 Head transmitter for integrated RTD:	
0	without
2	4...20 mA / without Ex approval
3	4...20 mA + HART / without Ex approval
4	Profibus PA / without Ex approval
5	Foundation Fieldbus / without Ex approval
6	4...20 mA / ATEX Ex ia
7	4...20 mA + HART / ATEX Ex ia
8	Profibus PA / ATEX Ex ia
9	Foundation Fieldbus / ATEX Ex ia
Y	others, please specify

Please see next page

FTH-25/26 continuation	
Code	Description
15. Differential pressure connection:	
A03	1 pair of nozzles, MNPT1/2" (remote version)
A03A03	2 pair of nozzles, MNPT1/2" (remote version)
A03A03A03	3 pair of nozzles, MNPT1/2" (remote version)
A04	1 pair of nozzles, MNPT1/4" (remote version)
A04A04	2 pair of nozzles, MNPT1/4" (remote version)
A04G	1 pair of nozzles, R1/4" male thread (remote version)
A04GA04G	2 pair of nozzles, R1/4" male thread (remote version)
A04S	1 pair of tube nozzle Ø6x4x1 (remote version)
R12	1 pair of pipe Ø12x1,5x50mm, material: 1.4571 (316Ti)
A12	1 pair Weld-on fitting Ermeto 12S, material: 316SS (remote version)
AS2	1 pair welding connection Ø21.3x3,2mm - welding end (remote version)
AS3	1 pair welding connection Ø21.3x6,3mm - welding end (remote version)
AS4	1 pair welding connection Ø24x4,0mm - welding end (remote version)
A06	IEC 61518; PTFE gasket
A16	IEC 61518; Viton gasket
A26	IEC 61518; PTFE gasket, cranked (for integrated temperature sensor or humid gas)
A36	IEC 61518; Viton gasket, cranked (for integrated temperature sensor or humid gas)
Y99	Special design
16. Shut-off valve for remote version (initial shut-off):	
A00	without
A54G	1 pair ball valve PN40, mat.: CF8M (1.4408), female R1/4", packing: PTFE
A54GA54G	2 pair ball valve PN40, mat.: CF8M (1.4408), female R1/4", packing: PTFE
A56	1 pair ball valve PN40, mat.: CF8M (1.4408), female 1/2" NPT, packing: PTFE
A56A56	2 pair ball valve PN40, mat.: CF8M (1.4408), female 1/2" NPT, packing: PTFE
A56A56A56	3 pair ball valve PN40, mat.: CF8M (1.4408), female 1/2" NPT, packing: PTFE
A62	1 pair valve, PN400, housing: SS316/316L, female 1/2" NPT, packing: Graphite
A62A62	2 pair valve, PN400, housing: SS316/316L, female 1/2" NPT, packing: Graphite
A62A62A62	3 pair valve, PN400, housing: SS316/316L, female 1/2" NPT, packing: Graphite
A81	1 pair gate valve 800lbs. housing: A105, female 1/2" NPT, packing: Graphite
A82	1 pair gate valve 800lbs. housing: 316SS, female 1/2" NPT, packing: Graphite
AV1	1 pair valve, PN400, housing: C22.8 (A105), Ø21,3x6,3/Ø14,0x2,5, packing: Graphite
AV2	1 pair valve, PN400, hsg: 1.4571 (316Ti), Ø21,3x6,3/Ø14,0x2,5, packing: Graphite
AV3	valve, PN400, housing: 1.5415 (16Mo3), Ø21,3x6,3/Ø14,0x2,5, packing: Graphite
Y99	others, please specify
16.1 First Shut-off accessories:	
0	without
E12	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø12mm, mat.: 316SS
E14	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø14mm, mat.: 316SS
Y99	others, please specify
16.2 Manifold for remote version:	
0	without
A65P	3-way-manifold, 316/316L, PN420 DN5, In/Out: 1/2"-NPTF/IEC61518-A, pckg: PTFE
A70P	5-way-manifold, 316/316L PN420 DN5, In/Out: 1/2"-NPTF/IEC61518-A, pckg: PTFE
Y99	others, please specify
16.2.1 Mounting set for remote version (manifold):	
0	without
MBC	mtg set, CS zinc-plated, for 2" pipe mounting, incl. screws 7/16-UNF/ FPM90-O-Ring
MBS	mtg set, stainless steel, for 2" pipe mounting, incl. screws 7/16-UNF/ FPM90-O-Ring
Y99	others, please specify

Itabar-Flow-Sensors

FTH-25/26 continuation	
Code	Description
16.2.2 Accessories for manifold:	
0	without
E12	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø12mm, mat.: 316SS
E14	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø14mm, mat.: 316SS
Y99	others, please specify
17. Valve block for compact version:	
A000	without
A66M	3-way-manifold, IEC 61518, material: 1.4404 (316L), packing: PTFE, screws M10
A66U	3-way-manifold, IEC 61518, material: 1.4404 (316L), pckg: PTFE, screws 7/16-UNF
A71M	5-way-manifold, IEC 61518, material: 1.4404 (316L), packing: PTFE, screws M10
A71U	5-way-manifold, IEC 61518, material: 1.4404 (316L), pckg: PTFE, screws 7/16-UNF
Y999	others, please specify
18. Special design/pre-assembly:	
0	without
M01	mounting of dp transmitter (customer provision)
M03	mounting of p transmitter (customer provision) with oval flange, mat. st.st.
A4	cleaned from oil+grease certificate
A5	oxygen service certificate
A6	PWIS free certificate (PWIS = paint-wetting impairment substances)
Y99	others, please specify

d3) FTH-35/36

ITABAR®-FLOW-SENSOR for Liquids and Gases, Flo-Tap-Version, flanged connection and transport spindles	
Code	Description
1. Type:	
FTH-35	Sensor Ø42mm (FloTap version with flanged process connection and transport spindles) (max. PN100) for liquids and gases without end support
FTH-36	Sensor Ø42mm (FloTap version with flanged process connection and transport spindles) (max. PN100) for liquids and gases with end support
2. Pipe (duct) size: (ID/WT):	
DN300	DN 300 / 12"
DN350	DN 350 / 14"
DN400	DN 400 / 16"
DN450	DN 450 / 18"
DN500	DN 500 / 20"
DN600	DN 600 / 24"
DN700	DN 700 / 28"
DN800	DN 800 / 32"
DN900	DN 900 / 36"
DN1000	DN 1000 / 40"
DN1100	DN 1100 / 44"
DN1200	DN 1200 / 48"
DN1400	DN 1400 / 56"
DN1600	DN 1600 / 64"
DN1800	DN 1800 / 72"
DN2000	DN 2000 / 80"
Y9	others, please specify
3. Material sensor / process connection:	
S	1.4404 / 316L
V	1.4571 / 316Ti
X	1.4462 / ASTM F51 / Duplex
K	1.4539 / AISI 904L
M	2.4360 / Alloy 400 / N04400
H	2.4610 / Alloy C4 / N06455
I	2.4858 / Alloy 825 / N08825
Y	others, please specify
4. Process connection	
00	without
FA	flange connection
Y	others, please specify
4.1 Standard:	
E	EN 1092-1
A	ASME B 16.5
D	DIN (according to type & pressure rating)
Y	others, please specify

Please see next page

Itabar-Flow-Sensors

FTH-35/36 continuation	
Code	Description
4.2 Nominal size:	
50	DN50
20	2"
Y9	others, please specify
4.3 Pressure class:	
C	PN16
D	PN40
E	PN63
F	PN100
K	150 lbs.
L	300 lbs.
M	600 lbs.
Y9	others, please specify
4.4 Flange face process connection flange:	
E0	EN 1092-1 Form A (without sealing strip; Ra 3.2-12.5µm)
E1	EN 1092-1 Form B1 (raised sealing strip; Ra 3,2-12,5µm)
E2	EN 1092-1 Form B2 (raised sealing strip; Ra 0,8-3,2µm)
E3	EN 1092-1 Form C (tongue; Ra 0,8-3,2µm)
E4	EN 1092-1 Form D (groove; Ra 0,8-3,2µm)
A1	ASME B 16.5 Raised Face (RF)
A2	ASME B 16.5 Raised Face Smooth Finish (RFSF)
A3	ASME B 16.5 Flat Face (FF)
A4	ASME B 16.5 Ring-Type Joint (RTJ)
A5	ASME B 16.5 Tongue (ASME)
A6	ASME B 16.5 Groove (ASME)
D1	DIN Form A (without special demand)
D2	DIN Form B (raised sealing strip ; Rz = 160µm)
D3	DIN Form C (raised sealing strip ; Rz = 160µm)
D4	DIN Form D (raised sealing strip ; Rz = 40µm)
D5	DIN Form E (raised sealing strip ; Rz = 16µm)
D6	DIN Form F (tongue acc. DIN 2512)
D7	DIN Form N (groove acc. DIN 2512)
Y9	others, please specify
4.5 Gasket:	
0	without
A	material: PTFE, thickness: 2 mm, max. 150°C (302°F)
B	Fibre-reinforced flat gasket; Klingersil C4400, thickness: 2 mm; max. 200°C (392°F)
C	Sp. wnd gasket w/IR(316)&AR(CS)filling graphite;thickn.:4.5mm;max.450°C(842°F)
D	Sp. wnd gasket w/IR(316SS)&AR(316SS)filling graph.;thickn.:4.5mm;max.450°C (842°F)
RO	Ring-Joint Seal Type R-Oval ASME B16.20
Y9	others, please specify

ase see next page

FTH-35/36 continuation	
Code	Description
4.6 Bolts/nuts:	
0	without
1	DIN931(ISO 4014)hex-head screw w/one nut; material: 5.6/5.2 (carbon steel zinc-plated)
2	DIN931 (ISO 4014) hex-head screw with one nut; material: A2-70 (stainless steel)
3	DIN 2510 Form L Material: 1.1181 / CK35
4	DIN 2510 Form L Material: 1.4301 / A2-70
5	ASME B16.5 Material: A193 Gr. B7 / A194 Gr. 2H (galvanised)
6	ASME B16.5 Material: A193 Gr. B8 Cl.1 / A194 Gr. 8
Y9	others, please specify
5. Design mounting stud:	
0	without (provided by others / customer /)
R	mounting stud with flange (standard)
W0	weldolet assembly, stud with flange
Y9	others, please specify
5.1 Material mounting stud:	
C	P250GH / A105
S	1.4404 / 316L
V	1.4571 / 316Ti
X	1.4462 / ASTM F51 / Duplex
K	1.4539 / AISI 904L
M	2.4360 / Alloy 400 / N04400
H	2.4610 / Alloy C4 / N06455
I	2.4858 / Alloy 825 / N08825
Y	others, please specify
5.2 standard:	
E	EN 1092-1
A	ASME B 16.5
D	DIN (according to type & pressure rating)
Y	others, please specify
5.3 nominal size:	
50	DN50
20	2"
Y9	others, please specify
5.4 Pressure class:	
C	PN16
D	PN40
E	PN63
F	PN100
K	150 lbs.
L	300 lbs.
M	600 lbs.
Y9	others, please specify

Please see next page

Itabar-Flow-Sensors

FTH-35/36 continuation	
Code	Description
5.5 Flange face mounting stud flange:	
E0	EN 1092-1 Form A (without sealing strip; Ra 3.2-12.5µm)
E1	EN 1092-1 Form B1 (raised sealing strip; Ra 3,2-12,5µm)
E2	EN 1092-1 Form B2 (raised sealing strip; Ra 0,8-3,2µm)
E3	EN 1092-1 Form C (tongue; Ra 0,8-3,2µm)
E4	EN 1092-1 Form D (groove; Ra 0,8-3,2µm)
A1	ASME B 16.5 Raised Face (RF)
A2	ASME B 16.5 Raised Face Smooth Finish (RFSF)
A3	ASME B 16.5 Flat Face (FF)
A4	ASME B 16.5 Ring-Type Joint (RTJ)
A5	ASME B 16.5 Tongue (ASME)
A6	ASME B 16.5 Groove (ASME)
D1	DIN Form A (without special demand)
D2	DIN Form B (raised sealing strip ; Rz = 160µm)
D3	DIN Form C (raised sealing strip ; Rz = 160µm)
D4	DIN Form D (raised sealing strip ; Rz = 40µm)
D5	DIN Form E (raised sealing strip ; Rz = 16µm)
D6	DIN Form F (tongue acc. DIN 2512)
D7	DIN Form N (groove acc. DIN 2512)
Y9	others, please specify
6. End support:	
0	without
C	material: C22.8 (similar A105)
S	material: 1.4404 / 316L
V	material: 1.4571 / 316Ti
X	material: 1.4462 / ASTM F51 / Duplex
K	material: 1.4539 / AISI 904L
M	material: 2.4360 / Alloy 400 / N04400
H	material: 2.4610 / Alloy C4 / N06455
I	material: 2.4858 / Alloy 825 / N08825
Y	others, please specify

Please see next page

FTH-35/36 continuation	
Code	Description
7. Isolation valve for the sensor profile (Flange face as mounting stud flange):	
00	without
MF30	ball valve flanged DN50 PN16, mat.: C.S., packing: PTFE
MF31	ball valve flanged DN50 PN16, mat.: CF8M (1.4408), packing: PTFE
MF32	ball valve flanged DN50 PN16, mat.: 1.4462 / ASTM F51 / Duplex, packing: PTFE
MF33	ball valve flanged DN50 PN16, mat.: 2.4360 / Alloy 400 / N04400, packing: PTFE
MF34	ball valve flanged DN50 PN16, mat.: 2.4610 / Alloy C4 / N06455, packing: PTFE
MF35	ball valve flanged DN50 PN40, mat.: C.S., packing: PTFE
MF36	ball valve flanged DN50 PN40, mat.: CF8M (1.4408), packing: PTFE
MF37	ball valve flanged DN50 PN40, mat.: 1.4462 / ASTM F51 / Duplex, packing: PTFE
MF38	ball valve flanged DN50 PN40, mat.: 2.4360 / Alloy 400 / N04400, packing: PTFE
MF39	ball valve flanged DN50 PN40, mat.: 2.4610 / Alloy C4 / N06455, packing: PTFE
MF47	ball valve flanged DN50 PN40, mat.: 1.4876 / Incoloy 800 packing: PTFE
MF48	ball valve flanged DN50 PN40, mat.: 2.4816 / Inconel 600, packing: PTFE
MF40	ball valve flanged DN50 PN63, mat.: C.S., packing: PTFE
MF41	ball valve flanged DN50 PN63, mat.: CF8M (1.4408), packing: PTFE
MF42	ball valve flanged DN50 PN63, mat.: 1.4462 / ASTM F51 / Duplex, packing: PTFE
MF43	ball valve flanged DN50 PN63, mat.: 2.4360 / Alloy 400 / N04400, packing: PTFE
MF44	ball valve flanged DN50 PN63, mat.: 2.4610 / Alloy C4 / N06455, packing: PTFE
MF45	ball valve flanged DN50 PN63, mat.: 1.4876 / Incoloy 800 packing: PTFE
MF46	ball valve flanged DN50 PN63, mat.: 2.4816 / Inconel 600, packing: PTFE
MS20	gate valve flanged DN50 PN100, mat.: C.S., packing: Graphite
MS21	gate valve flanged DN50 PN100, mat.: stainless steel, packing: Graphite
AF30	ball valve flanged 2" ANSI 150 lbs, mat.: C.S., packing: PTFE
AF31	ball valve flanged 2" ANSI 150 lbs, mat.: CF8M (1.4408), packing: PTFE
AF32	ball valve flanged 2" ANSI 150 lbs, mat.: 1.4462 / ASTM F51 / Duplex, packing: PTFE
AF33	ball valve flanged 2" ANSI 150 lbs, mat.: 2.4360 / Alloy 400 / N04400, packing: PTFE
AF34	ball valve flanged 2" ANSI 150 lbs, mat.: 2.4610 / Alloy C4 / N06455, packing: PTFE
AF35	ball valve flanged 2" ANSI 300 lbs, mat.: C.S., packing: PTFE
AF36	ball valve flanged 2" ANSI 300 lbs, mat.: CF8M (1.4408), packing: PTFE
AF37	ball valve flanged 2" ANSI 300 lbs, mat.: 1.4462 / ASTM F51 / Duplex, packing: PTFE
AF38	ball valve flanged 2" ANSI 300 lbs, mat.: 2.4360 / Alloy 400 / N04400, packing: PTFE
AF39	ball valve flanged 2" ANSI 300 lbs, mat.: 2.4610 / Alloy C4 / N06455, packing: PTFE
AF40	ball valve flanged 2" ANSI 300 lbs, mat.: 1.4876 / Incoloy 800 packing: PTFE
AF41	ball valve flanged 2" ANSI 300 lbs, mat.: 2.4816 / Inconel 600, packing: PTFE
AS20	gate valve flanged 2" ANSI 600 lbs, mat.: C.S., packing: Graphite
AS21	gate valve flanged 2" ANSI 600 lbs, mat.: stainless steel, packing: Graphite
Y99	others, please specify
8. Flanged packing gland:	
S	material: 1.4404 / 316L
V	material: 1.4571 / 316Ti
X	material: 1.4462 / ASTM F51 / Duplex
K	material: 1.4539 / AISI 904L
M	material: 2.4360 / Alloy 400 / N04400
H	material: 2.4610 / Alloy C4 / N06455
I	material: 2.4858 / Alloy 825 / N08825
Y	others, please specify

Please see next page

Itabar-Flow-Sensors

FTH-35/36 continuation	
Code	Description
9. Cage nipple:	
PC	material: P235GH (similar A106)
PS	material: 1.4404 / 316L
PV	material: 1.4571 / 316Ti
PX	material: 1.4462 / ASTM F51 / Duplex
PK	material: 1.4539 / AISI 904L
PM	material: 2.4360 / Alloy 400 / N04400
PH	material: 2.4610 / Alloy C4 / N06455
PI	material: 2.4858 / Alloy 825 / N08825
Y9	others, please specify
10. Packing material for the flanged and welded packing gland:	
1	packing material: PTFE, max. 200°C
2	packing material: graphite, max. 400°C
Y9	Special design
11. Gear / material of gear box:	
0	without
1	with gear / die-cast aluminium
2	with gear / stainless steel
Y	Special design
12. Pipe insulation:	
KI	without
X	insulation in mm (min. 50mm)
Y	others, please specify
13. Pipe run/flow direction:	
HL	horizontal, left
HR	horizontal, right
VD	vertical, down
VU	vertical, upwards
Y9	others, please specify
14. Integrated temperature sensor:	
T0	without
TA	3-wire, RTD -50 bis 400°C, without Ex approval, Sensor diameter=Ø0.5mm
TB	3-wire, RTD -50 bis 400°C, Ex approval, Sensor diameter=Ø3,0mm
TC	thermocouple type K with INT5334-A3B non-ex-version; 4...20 mA output
TX	sensor prepared for PT100, probe diameter = Ø3,0mm (customer provision)
Y	others, please specify
14.1 Head transmitter for integrated RTD:	
0	without
2	4...20 mA / without Ex approval
3	4...20 mA + HART / without Ex approval
4	Profibus PA / without Ex approval
5	Foundation Fieldbus / without Ex approval
6	4...20 mA / ATEX Ex ia
7	4...20 mA + HART / ATEX Ex ia
8	Profibus PA / ATEX Ex ia
9	Foundation Fieldbus / ATEX Ex ia
Y	others, please specify

Please see next page

FTH-35/36 continuation	
Code	Description
15. Differential pressure connection:	
A03	1 pair of nozzles, MNPT1/2" (remote version)
A03A03	2 pair of nozzles, MNPT1/2" (remote version)
A03A03A03	3 pair of nozzles, MNPT1/2" (remote version)
A04	1 pair of nozzles, MNPT1/4" (remote version)
A04A04	2 pair of nozzles, MNPT1/4" (remote version)
A04G	1 pair of nozzles, R1/4" male thread (remote version)
A04GA04G	2 pair of nozzles, R1/4" male thread (remote version)
A04S	1 pair of tube nozzle Ø6x4x1 (remote version)
R12	1 pair of pipe Ø12x1,5x50mm, material: 1.4571 (316Ti)
A12	1 pair Weld-on fitting Ermeto 12S, material: 316SS (remote version)
AS2	1 pair welding connection Ø21.3x3,2mm - welding end (remote version)
AS3	1 pair welding connection Ø21.3x6,3mm - welding end (remote version)
AS4	1 pair welding connection Ø24x4,0mm - welding end (remote version)
A06	IEC 61518; PTFE gasket
A16	IEC 61518; Viton gasket
A26	IEC 61518; PTFE gasket, cranked (for integrated temperature sensor or humid gas)
A36	IEC 61518; Viton gasket, cranked (for integrated temperature sensor or humid gas)
Y99	Special design
16. Shut-off valve for remote version (initial shut-off):	
A00	without
A54G	1 pair ball valve PN40, mat.: CF8M (1.4408), female R1/4", packing: PTFE
A54GA54G	2 pair ball valve PN40, mat.: CF8M (1.4408), female R1/4", packing: PTFE
A56	1 pair ball valve PN40, mat.: CF8M (1.4408), female 1/2" NPT, packing: PTFE
A56A56	2 pair ball valve PN40, mat.: CF8M (1.4408), female 1/2" NPT, packing: PTFE
A56A56A56	3 pair ball valve PN40, mat.: CF8M (1.4408), female 1/2" NPT, packing: PTFE
A62	1 pair valve, PN400, housing: SS316/316L, female 1/2" NPT, packing: Graphite
A62A62	2 pair valve, PN400, housing: SS316/316L, female 1/2" NPT, packing: Graphite
A62A62A62	3 pair valve, PN400, housing: SS316/316L, female 1/2" NPT, packing: Graphite
A81	1 pair gate valve 800lbs. housing: A105, female 1/2" NPT, packing: Graphite
A82	1 pair gate valve 800lbs. housing: 316SS, female 1/2" NPT, packing: Graphite
AV1	1 pair valve, PN400, housing: C22.8 (A105), Ø21,3x6,3/Ø14,0x2,5 , packing: Graphite
AV2	1 pair valve, PN400, hsg: 1.4571 (316Ti), Ø21,3x6,3/Ø14,0x2,5 , packing: Graphite
AV3	valve, PN400, housing: 1.5415 (16Mo3), Ø21,3x6,3/Ø14,0x2,5 , packing: Graphite
Y99	others, please specify
16.1 First Shut-off accessories:	
0	without
E12	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø12mm, mat.: 316SS
E14	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø14mm, mat.: 316SS
Y99	others, please specify
16.2 Manifold for remote version:	
0	without
A65P	3-way-manifold, 316/316L, PN420 DN5, In/Out: 1/2"-NPTF/IEC61518-A, pckg: PTFE
A70P	5-way-manifold, 316/316L PN420 DN5, In/Out: 1/2"-NPTF/IEC61518-A, pckg: PTFE
Y99	others, please specify

Please see next page

Itabar-Flow-Sensors

FTH-35/36 continuation	
Code	Description
16.2.1 Mounting set for remote version (manifold):	
0	without
MBC	mtg set, CS zinc-plated, for 2" pipe mounting, incl. screws 7/16-UNF/ FPM90-O-Ring
MBS	mtg set, stainless steel, for 2" pipe mounting, incl. screws 7/16-UNF/ FPM90-O-Ring
Y99	others, please specify
16.2.2 Accessories for manifold:	
0	without
E12	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø12mm, mat.: 316SS
E14	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø14mm, mat.: 316SS
Y99	others, please specify
17. Valve block for compact version:	
A000	without
A66M	3-way-manifold, IEC 61518, material: 1.4404 (316L), packing: PTFE, screws M10
A66U	3-way-manifold, IEC 61518, material: 1.4404 (316L), pckg: PTFE, screws 7/16-UNF
A71M	5-way-manifold, IEC 61518, material: 1.4404 (316L), packing: PTFE, screws M10
A71U	5-way-manifold, IEC 61518, material: 1.4404 (316L), pckg: PTFE, screws 7/16-UNF
Y999	others, please specify
18. Special design/pre-assembly:	
0	without
M01	mounting of dp transmitter (customer provision)
M03	mounting of p transmitter (customer provision) with oval flange, mat. st.st.
A4	cleaned from oil+grease certificate
A5	oxygen service certificate
A6	PWIS free certificate (PWIS = paint-wetting impairment substances)
Y99	others, please specify

d4) FTH-65/66

ITABAR®-FLOW-SENSOR for Liquids and Gases, Flo-Tap-Version, flanged connection and transport spindles	
Code	Description
1. Type:	
FTH-65	Sensor Ø56mm (FloTap version with flanged process connection and transport spindles) (max. PN100) for liquids and gases without end support
FTH-66	Sensor Ø56mm (FloTap version with flanged process connection and transport spindles) (max. PN100) for liquids and gases with end support
2. Pipe (duct) size: (ID/WT):	
DN300	DN 300 / 12"
DN350	DN 350 / 14"
DN400	DN 400 / 16"
DN450	DN 450 / 18"
DN500	DN 500 / 20"
DN600	DN 600 / 24"
DN700	DN 700 / 28"
DN800	DN 800 / 32"
DN900	DN 900 / 36"
DN1000	DN 1000 / 40"
DN1100	DN 1100 / 44"
DN1200	DN 1200 / 48"
DN1400	DN 1400 / 56"
DN1600	DN 1600 / 64"
DN1800	DN 1800 / 72"
DN2000	DN 2000 / 80"
Y9	others, please specify
3. Material sensor / process connection:	
S	1.4404 / 316L
V	1.4571 / 316Ti
X	1.4462 / ASTM F51 / Duplex
K	1.4539 / AISI 904L
M	2.4360 / Alloy 400 / N04400
H	2.4610 / Alloy C4 / N06455
I	2.4858 / Alloy 825 / N08825
Y	others, please specify
4. Process connection	
00	without
FA	flange connection
Y	others, please specify
4.1 Standard:	
E	EN 1092-1
A	ASME B 16.5
D	DIN (according to type & pressure rating)
Y	others, please specify

Please see next page

Itabar-Flow-Sensors

FTH-65/66 continuation	
Code	Description
4.2 Nominal size:	
80	DN80
30	3"
Y9	others, please specify
4.3 Pressure class:	
C	PN16
D	PN40
E	PN63
F	PN100
K	150 lbs.
L	300 lbs.
M	600 lbs.
Y9	others, please specify
4.4 Flange face process connection flange:	
E0	EN 1092-1 Form A (without sealing strip; Ra 3.2-12.5µm)
E1	EN 1092-1 Form B1 (raised sealing strip; Ra 3,2-12,5µm)
E2	EN 1092-1 Form B2 (raised sealing strip; Ra 0,8-3,2µm)
E3	EN 1092-1 Form C (tongue; Ra 0,8-3,2µm)
E4	EN 1092-1 Form D (groove; Ra 0,8-3,2µm)
A1	ASME B 16.5 Raised Face (RF)
A2	ASME B 16.5 Raised Face Smooth Finish (RFSF)
A3	ASME B 16.5 Flat Face (FF)
A4	ASME B 16.5 Ring-Type Joint (RTJ)
A5	ASME B 16.5 Tongue (ASME)
A6	ASME B 16.5 Groove (ASME)
D1	DIN Form A (without special demand)
D2	DIN Form B (raised sealing strip ; Rz = 160µm)
D3	DIN Form C (raised sealing strip ; Rz = 160µm)
D4	DIN Form D (raised sealing strip ; Rz = 40µm)
D5	DIN Form E (raised sealing strip ; Rz = 16µm)
D6	DIN Form F (tongue acc. DIN 2512)
D7	DIN Form N (groove acc. DIN 2512)
Y9	others, please specify
4.5 Gasket:	
0	without
A	material: PTFE, thickness: 2 mm, max. 150°C (302°F)
B	Fibre-reinforced flat gasket; Klingsil C4400, thickness: 2 mm; max. 200°C (392°F)
C	Sp. wnd gasket w/IR(316)&AR(CS)filling graphite;thickn.:4.5mm;max.450°C(842°F)
D	Sp. wnd gasket w/IR(316SS)&AR(316SS)filling graph.;thickn.:4.5mm;max.450°C (842°F)
RO	Ring-Joint Seal Type R-Oval ASME B16.20
Y9	others, please specify

ase see next page

FTH-65/66 continuation	
Code	Description
4.6 Bolts/nuts:	
0	without
1	DIN931(ISO 4014)hex-head screw w/one nut; material: 5.6/5.2 (carbon steel zinc-plated)
2	DIN931 (ISO 4014) hex-head screw with one nut; material: A2-70 (stainless steel)
3	DIN 2510 Form L Material: 1.1181 / CK35
4	DIN 2510 Form L Material: 1.4301 / A2-70
5	ASME B16.5 Material: A193 Gr. B7 / A194 Gr. 2H (galvanised)
6	ASME B16.5 Material: A193 Gr. B8 Cl.1 / A194 Gr. 8
Y9	others, please specify
5. Design mounting stud:	
0	without (provided by others / customer /)
R	mounting stud with flange (standard)
W0	weldolet assembly, stud with flange
Y9	others, please specify
5.1 Material mounting stud:	
C	P250GH / A105
S	1.4404 / 316L
V	1.4571 / 316Ti
X	1.4462 / ASTM F51 / Duplex
K	1.4539 / AISI 904L
M	2.4360 / Alloy 400 / N04400
H	2.4610 / Alloy C4 / N06455
I	2.4858 / Alloy 825 / N08825
Y	others, please specify
5.2 standard:	
E	EN 1092-1
A	ASME B 16.5
D	DIN (according to type & pressure rating)
Y	others, please specify
5.3 nominal size:	
80	DN80
30	3"
Y9	others, please specify
5.4 Pressure class:	
C	PN16
D	PN40
E	PN63
F	PN100
K	150 lbs.
L	300 lbs.
M	600 lbs.
Y9	others, please specify

Please see next page

Itabar-Flow-Sensors

FTH-65/66 continuation	
Code	Description
5.5 Flange face mounting stud flange:	
E0	EN 1092-1 Form A (without sealing strip; Ra 3.2-12.5µm)
E1	EN 1092-1 Form B1 (raised sealing strip; Ra 3,2-12,5µm)
E2	EN 1092-1 Form B2 (raised sealing strip; Ra 0,8-3,2µm)
E3	EN 1092-1 Form C (tongue; Ra 0,8-3,2µm)
E4	EN 1092-1 Form D (groove; Ra 0,8-3,2µm)
A1	ASME B 16.5 Raised Face (RF)
A2	ASME B 16.5 Raised Face Smooth Finish (RFSF)
A3	ASME B 16.5 Flat Face (FF)
A4	ASME B 16.5 Ring-Type Joint (RTJ)
A5	ASME B 16.5 Tongue (ASME)
A6	ASME B 16.5 Groove (ASME)
D1	DIN Form A (without special demand)
D2	DIN Form B (raised sealing strip ; Rz = 160µm)
D3	DIN Form C (raised sealing strip ; Rz = 160µm)
D4	DIN Form D (raised sealing strip ; Rz = 40µm)
D5	DIN Form E (raised sealing strip ; Rz = 16µm)
D6	DIN Form F (tongue acc. DIN 2512)
D7	DIN Form N (groove acc. DIN 2512)
Y9	others, please specify
6. End support:	
0	without
C	material: C22.8 (similar A105)
S	material: 1.4404 / 316L
V	material: 1.4571 / 316Ti
X	material: 1.4462 / ASTM F51 / Duplex
K	material: 1.4539 / AISI 904L
M	material: 2.4360 / Alloy 400 / N04400
H	material: 2.4610 / Alloy C4 / N06455
I	material: 2.4858 / Alloy 825 / N08825
Y	others, please specify

Please see next page

FTH-65/66 continuation	
Code	Description
7. Isolation valve for the sensor profile (Flange face as mounting stud flange):	
00	without
MF50	ball valve flanged DN80 PN16, mat.: C.S., packing: PTFE
MF51	ball valve flanged DN80 PN16, mat.: CF8M (1.4408), packing: PTFE
MF52	ball valve flanged DN80 PN16, mat.: 1.4462 / ASTM F51 / Duplex, packing: PTFE
MF53	ball valve flanged DN80 PN16, mat.: 2.4360 / Alloy 400 / N04400, packing: PTFE
MF54	ball valve flanged DN80 PN16, mat.: 2.4610 / Alloy C4 / N06455, packing: PTFE
MF55	ball valve flanged DN80 PN40, mat.: C.S., packing: PTFE
MF56	ball valve flanged DN80 PN40, mat.: CF8M (1.4408), packing: PTFE
MF57	ball valve flanged DN80 PN40, mat.: 1.4462 / ASTM F51 / Duplex, packing: PTFE
MF58	ball valve flanged DN80 PN40, mat.: 2.4360 / Alloy 400 / N04400, packing: PTFE
MF59	ball valve flanged DN80 PN40, mat.: 2.4610 / Alloy C4 / N06455, packing: PTFE
MF67	ball valve flanged DN80 PN40, mat.: 1.4876 / Incoloy 800 packing: PTFE
MF68	ball valve flanged DN80 PN40, mat.: 2.4816 / Inconel 600, packing: PTFE
MF60	ball valve flanged DN80 PN63, mat.: C.S., packing: PTFE
MF61	ball valve flanged DN80 PN63, mat.: CF8M (1.4408), packing: PTFE
MF62	ball valve flanged DN80 PN63, mat.: 1.4462 / ASTM F51 / Duplex, packing: PTFE
MF63	ball valve flanged DN80 PN63, mat.: 2.4360 / Alloy 400 / N04400, packing: PTFE
MF64	ball valve flanged DN80 PN63, mat.: 2.4610 / Alloy C4 / N06455, packing: PTFE
MF65	ball valve flanged DN80 PN63, mat.: 1.4876 / Incoloy 800 packing: PTFE
MF66	ball valve flanged DN80 PN63, mat.: 2.4816 / Inconel 600, packing: PTFE
MS30	gate valve flanged DN80 PN100, mat.: C.S., packing: Graphite
MS31	gate valve flanged DN80 PN100, mat.: stainless steel, packing: Graphite
AF50	ball valve flanged 3" ANSI 150 lbs, mat.: C.S., packing: PTFE
AF51	ball valve flanged 3" ANSI 150 lbs, mat.: CF8M (1.4408), packing: PTFE
AF52	ball valve flanged 3" ANSI 150 lbs, mat.: 1.4462 / ASTM F51 / Duplex, packing: PTFE
AF53	ball valve flanged 3" ANSI 150 lbs, mat.: 2.4360 / Alloy 400 / N04400, packing: PTFE
AF54	ball valve flanged 3" ANSI 150 lbs, mat.: 2.4610 / Alloy C4 / N06455, packing: PTFE
AF55	ball valve flanged 3" ANSI 300 lbs, mat.: C.S., packing: PTFE
AF56	ball valve flanged 3" ANSI 300 lbs, mat.: CF8M (1.4408), packing: PTFE
AF57	ball valve flanged 3" ANSI 300 lbs, mat.: 1.4462 / ASTM F51 / Duplex, packing: PTFE
AF58	ball valve flanged 3" ANSI 300 lbs, mat.: 2.4360 / Alloy 400 / N04400, packing: PTFE
AF59	ball valve flanged 3" ANSI 300 lbs, mat.: 2.4610 / Alloy C4 / N06455, packing: PTFE
AF60	ball valve flanged 3" ANSI 300 lbs, mat.: 1.4876 / Incoloy 800 packing: PTFE
AF61	ball valve flanged 3" ANSI 300 lbs, mat.: 2.4816 / Inconel 600, packing: PTFE
AS30	gate valve flanged 3" ANSI 600 lbs, mat.: C.S., packing: Graphite
AS31	gate valve flanged 3" ANSI 600 lbs, mat.: stainless steel, packing: Graphite
Y99	others, please specify
8. Flanged packing gland:	
S	material: 1.4404 / 316L
V	material: 1.4571 / 316Ti
X	material: 1.4462 / ASTM F51 / Duplex
K	material: 1.4539 / AISI 904L
M	material: 2.4360 / Alloy 400 / N04400
H	material: 2.4610 / Alloy C4 / N06455
I	material: 2.4858 / Alloy 825 / N08825
Y	others, please specify

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FTH-65/66 continuation	
Code	Description
9. Cage nipple:	
PC	material: P235GH (similar A106)
PS	material: 1.4404 / 316L
PV	material: 1.4571 / 316Ti
PX	material: 1.4462 / ASTM F51 / Duplex
PK	material: 1.4539 / AISI 904L
PM	material: 2.4360 / Alloy 400 / N04400
PH	material: 2.4610 / Alloy C4 / N06455
PI	material: 2.4858 / Alloy 825 / N08825
Y9	others, please specify
10. Packing material for the flanged and welded packing gland:	
1	packing material: PTFE, max. 200°C
2	packing material: graphite, max. 400°C
Y9	Special design
11. Gear / material of gear box:	
0	without
1	with gear / die-cast aluminium
2	with gear / stainless steel
Y	Special design
12. Pipe insulation:	
KI	without
X	insulation in mm (min. 50mm)
Y	others, please specify
13. Pipe run/flow direction:	
HL	horizontal, left
HR	horizontal, right
VD	vertical, down
VU	vertical, upwards
Y9	others, please specify
14. Integrated temperature sensor:	
T0	without
TA	3-wire, RTD -50 bis 400°C, without Ex approval, Sensor diameter=Ø0.5mm
TB	3-wire, RTD -50 bis 400°C, Ex approval, Sensor diameter=Ø3,0mm
TC	thermocouple type K with INT5334-A3B non-ex-version; 4...20 mA output
TX	sensor prepared for PT100, probe diameter = Ø3,0mm (customer provision)
Y	others, please specify
14.1 Head transmitter for integrated RTD:	
0	without
2	4...20 mA / without Ex approval
3	4...20 mA + HART / without Ex approval
4	Profibus PA / without Ex approval
5	Foundation Fieldbus / without Ex approval
6	4...20 mA / ATEX Ex ia
7	4...20 mA + HART / ATEX Ex ia
8	Profibus PA / ATEX Ex ia
9	Foundation Fieldbus / ATEX Ex ia
Y	others, please specify

Please see next page

FTH-65/66 continuation	
Code	Description
15. Differential pressure connection:	
A03	1 pair of nozzles, MNPT 1/2" (remote version)
A03A03	2 pair of nozzles, MNPT 1/2" (remote version)
A03A03A03	3 pair of nozzles, MNPT 1/2" (remote version)
A04	1 pair of nozzles, MNPT 1/4" (remote version)
A04A04	2 pair of nozzles, MNPT 1/4" (remote version)
A04G	1 pair of nozzles, R1/4" male thread (remote version)
A04GA04G	2 pair of nozzles, R1/4" male thread (remote version)
A04S	1 pair of tube nozzle Ø6x4x1 (remote version)
R12	1 pair of pipe Ø12x1,5x50mm, material: 1.4571 (316Ti)
A12	1 pair Weld-on fitting Ermeto 12S, material: 316SS (remote version)
AS2	1 pair welding connection Ø21.3x3,2mm - welding end (remote version)
AS3	1 pair welding connection Ø21.3x6,3mm - welding end (remote version)
AS4	1 pair welding connection Ø24x4,0mm - welding end (remote version)
A06	IEC 61518; PTFE gasket
A16	IEC 61518; Viton gasket
A26	IEC 61518; PTFE gasket, cranked (for integrated temperature sensor or humid gas)
A36	IEC 61518; Viton gasket, cranked (for integrated temperature sensor or humid gas)
Y99	Special design
16. Shut-off valve for remote version (initial shut-off):	
A00	without
A54G	1 pair ball valve PN40, mat.: CF8M (1.4408), female R1/4", packing: PTFE
A54GA54G	2 pair ball valve PN40, mat.: CF8M (1.4408), female R1/4", packing: PTFE
A56	1 pair ball valve PN40, mat.: CF8M (1.4408), female 1/2" NPT, packing: PTFE
A56A56	2 pair ball valve PN40, mat.: CF8M (1.4408), female 1/2" NPT, packing: PTFE
A56A56A56	3 pair ball valve PN40, mat.: CF8M (1.4408), female 1/2" NPT, packing: PTFE
A62	1 pair valve, PN400, housing: SS316/316L, female 1/2" NPT, packing: Graphite
A62A62	2 pair valve, PN400, housing: SS316/316L, female 1/2" NPT, packing: Graphite
A62A62A62	3 pair valve, PN400, housing: SS316/316L, female 1/2" NPT, packing: Graphite
A81	1 pair gate valve 800lbs. housing: A105, female 1/2" NPT, packing: Graphite
A82	1 pair gate valve 800lbs. housing: 316SS, female 1/2" NPT, packing: Graphite
AV1	1 pair valve, PN400, housing: C22.8 (A105), Ø21,3x6,3/Ø14,0x2,5 , packing: Graphite
AV2	1 pair valve, PN400, hsg: 1.4571 (316Ti), Ø21,3x6,3/Ø14,0x2,5 , packing: Graphite
AV3	valve, PN400, housing: 1.5415 (16Mo3), Ø21,3x6,3/Ø14,0x2,5 , packing: Graphite
Y99	others, please specify
16.1 First Shut-off accessories:	
0	without
E12	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø12mm, mat.: 316SS
E14	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø14mm, mat.: 316SS
Y99	others, please specify
16.2 Manifold for remote version:	
0	without
A65P	3-way-manifold, 316/316L, PN420 DN5, In/Out: 1/2"-NPTF/IEC61518-A, pckg: PTFE
A70P	5-way-manifold, 316/316L PN420 DN5, In/Out: 1/2"-NPTF/IEC61518-A, pckg: PTFE
Y99	others, please specify

Please see next page

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FTH-65/66 continuation	
Code	Description
16.2.1 Mounting set for remote version (manifold):	
0	without
MBC	mtg set, CS zinc-plated, for 2" pipe mounting, incl. screws 7/16-UNF/ FPM90-O-Ring
MBS	mtg set, stainless steel, for 2" pipe mounting, incl. screws 7/16-UNF/ FPM90-O-Ring
Y99	others, please specify
16.2.2 Accessories for manifold:	
0	without
E12	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø12mm, mat.: 316SS
E14	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø14mm, mat.: 316SS
Y99	others, please specify
17. Valve block for compact version:	
A000	without
A66M	3-way-manifold, IEC 61518, material: 1.4404 (316L), packing: PTFE, screws M10
A66U	3-way-manifold, IEC 61518, material: 1.4404 (316L), pckg: PTFE, screws 7/16-UNF
A71M	5-way-manifold, IEC 61518, material: 1.4404 (316L), packing: PTFE, screws M10
A71U	5-way-manifold, IEC 61518, material: 1.4404 (316L), pckg: PTFE, screws 7/16-UNF
Y999	others, please specify
18. Special design/pre-assembly:	
0	without
M01	mounting of dp transmitter (customer provision)
M03	mounting of p transmitter (customer provision) with oval flange, mat. st.st.
A4	cleaned from oil+grease certificate
A5	oxygen service certificate
A6	PWIS free certificate (PWIS = paint-wetting impairment substances)
Y99	others, please specify

C Itabar®-Flow-Sensors for Steam

C.1 General Information

C.1.1 Selection Criteria

The tables in this section offer an overview of DP sensors used in steam flow measurement, their design elements and the various installation options.

The following tables allow the material selection for all important components, depending on operating pressures and temperatures. The operating limits mentioned are determined by the assembly parts, (e.g. threaded weld-o-lets and assembly flanges). For a particular process condition other components – such as sensor profile, condensate pots and shut-off valves - can be selected with the help of pressure- and temperature tables.

Condensate pots are required for steam flow measurement so that a constant transition from steam to condensate and vice versa is assured. Furthermore the water buffer inside the condensate pots serves as temperature protection for the connected DP transmitter. If not otherwise specified by the customer the condensate pots are supplied welded to the shut-off valves.

In cases where a double shut-off assembly with two shut-off valves is needed the order code is to be expanded accordingly.

The following selection process for steam flow sensors is recommended:

C.1.2 Selection of the Proper Sensor Type

- 1.) Material selection of sensor types and their assembly parts; the material has to fit the pipe material in order for the welding to be compatible.
- 2.) Pressure rating selection of assembly parts; must be able to handle the operating pressure and temperature of the steam.
- 3.) If applicable: Selection of wet-tap or non-wet-tap option and model
- 4.) If applicable: Selection of mechanical connecting parts between assembly portion of the sensor and the pipe.

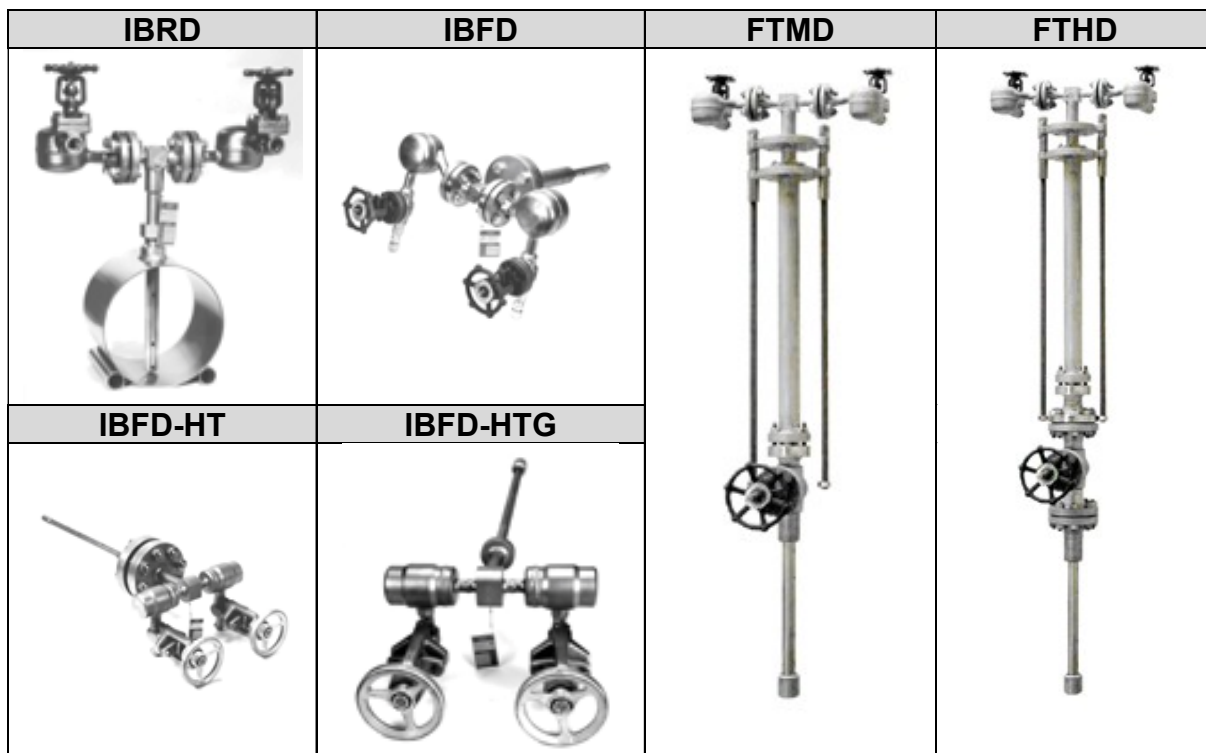
The WINFLOW sizing program helps the customer to select the correct sensor type depending on the maximum flow volume and the pipe size.

C.1.3 Selection of Options

The selection of the various options is done in the sequence suggested by the sensor's „Order Code Information“. It is important to note that the materials of the sensor (sensor profile, condensate pots, valves) not necessarily have to be identical with the material of the assembly parts. The following options are available :

- 1.) Selection of the sensor material: the material of the sensor profile must meet the application's operating pressure and temperature requirements
 - 2.) Selection of the condensate pots: the material and version of the condensate pots must meet the application's operating pressure and temperature requirements.
- Selection of the valves for the pressure connections appropriate for the steam's operating pressure and temperature.

C.1.4 Steam Sensor Overview



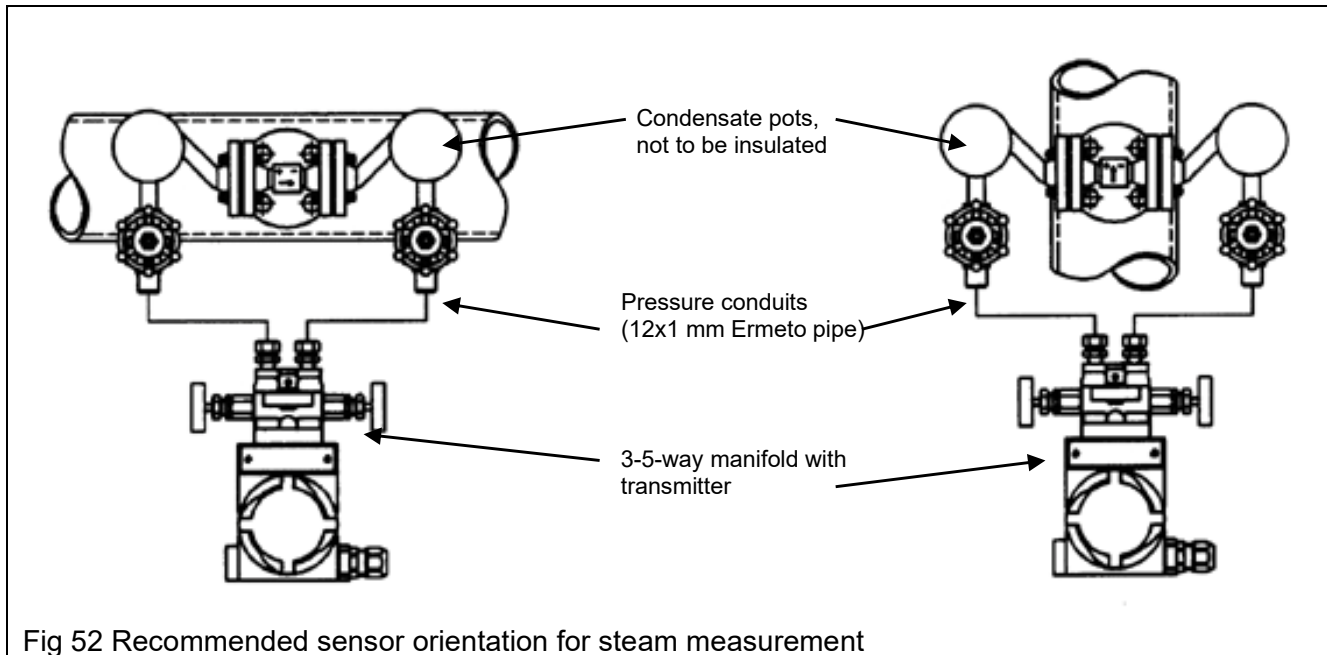
Features:	IBRD	IBFD	IBFD-HT	IBFD-HTG	FTMD	FTHD
Installation / Removal:						
Installation under pressure possible	✗	✗	✗	✗	✓	✓
Pipe to be emptied for installation	✓	✓	✓	✓	✗	✗
Material of mounting assembly parts (in order to weld it should be same as pipe material)						
C-steel	✓	✓	✗	✗	✓	✓
(1.4571) st steel	✗	✗	✗	✗	✓	✓
15 Mo 3, 13 CrMo 4 4, 10 CrMo 9 10, 10 CrMoVnb 91	✗	✓	✓	✓	✗	✗
Sensor material in accordance with AD 2000 (to be selected for specific operating conditions)						
St steel (1.4571) EN 10222-2 (IBFD max 400 °C (752 °F), IBRD max. 200 °C [392°F])	✓	✓	✗	✗	✓	✓
1.5415, 15 Mo 3 (to max. 530 °C [986 °F])	✗	✗	✓	✓	✗	✗
1.7335, 13 CrMo 4 4 (to max. 560 °C [1040 °F])	✗	✗	✓	✓	✗	✗
1.7380, 10 CrMo 9 10 (to max. 590 °C [1094 °F])	✗	✗	✓	✓	✗	✗
1.4903, 10 CrMoVnb 91 (to max.650 °C [1202 °F])	✗	✗	✓	✓	✗	✗
Type of mounting assembly:						
Threaded weld-o-let (to max. 200 °C [392 °F])	✓	✗	✗	✗	✗	✗
Welding boss (to max. 200 °C [392 °F])	✗	✗	✗	✗	✓	✗
Flanged weld assembly	✗	✓	✓	✗	✗	✓
Weld assembly w/out flange	✗	✗	✗	✓	✗	✗
Further design features:						
Single-piece welded construction	✗	✗	✗	✓		
Threaded shut-off valves for sensor profile	✗	✗	✗	✗	✓	✗
Flanged shut-off valves for sensor profile	✗	✗	✗	✗	✗	✓
Screw-rods for easy removal	✗	✗	✗	✗	✓	✓
Option: wheel for removal	✗	✗	✗	✗	✓	✓

Note:

316L/H can be welded to 16Mo3 and 13CrMo44. It is **not weldable** to 10CrMo910 and X10CrMoVnb91.

C.1.5 Installation Postition (Flow sensors for steam)

Steam, the sensor is always to be inserted from the side into a pipe, the transition between the aggregate conditions steam and water must be allowed to take place freely, the transmitter is to be installed below the pressure process connections. The water columns of the condensate pots must be located above the transmitter at exactly the same hydrostatic level.



Important: When measuring steam never insert the sensor from the top into a pipe !

IB*D

C.2 Itabar for Steam Measurement (fixed installation)

IBRD

C.2.1 Itabar with threaded process connection

a.) Description

The ITABAR steam sensors series IBRD are designed to measure steam up to 235.2 PSI (16 bar) and 392°F (200°C). The standard sensor material is 316 st steel (1.4571). The installation is normally done with threaded weld-o-lets. For safety reasons it is important to ensure the tightness of the threaded connection. Tightening of the threaded nut should be done with a wrench.

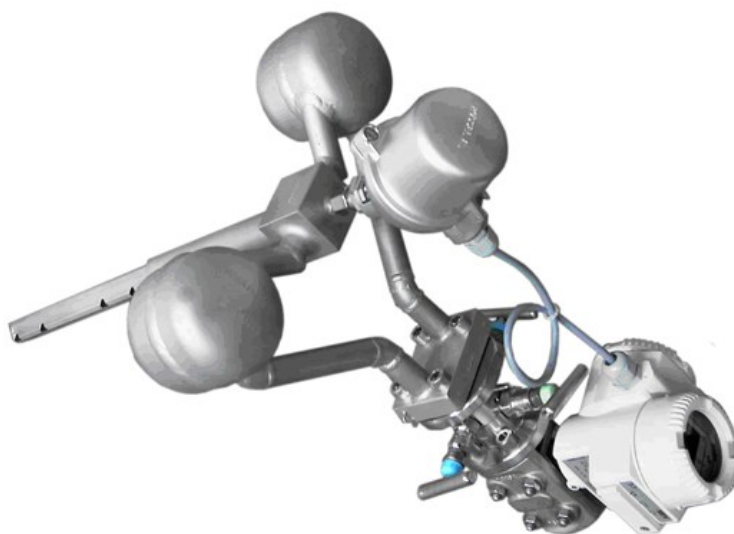


Fig 53: Compact version of a flow sensor used to measure steam mass flow. The components: Itabar-Flow-Sensor with welded condensate pots, wet-tap temperature sensor, flange plate with 3-way-manifold and Δp -transmitter to measure the differential pressure, the operating pressure and the operating temperature, and to calculate mass flow.

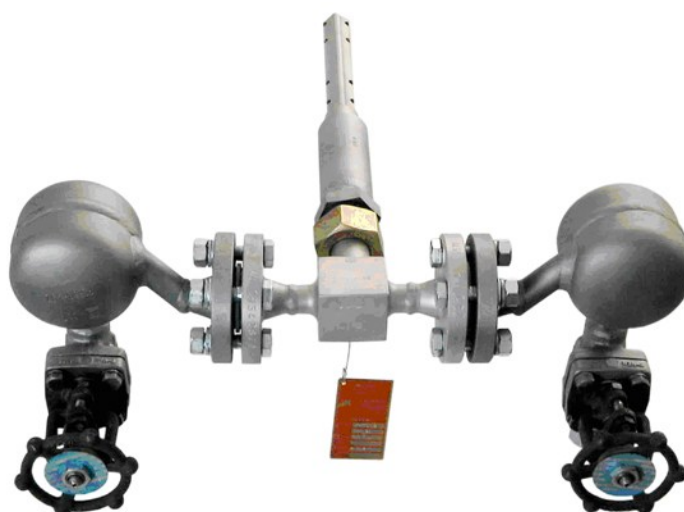
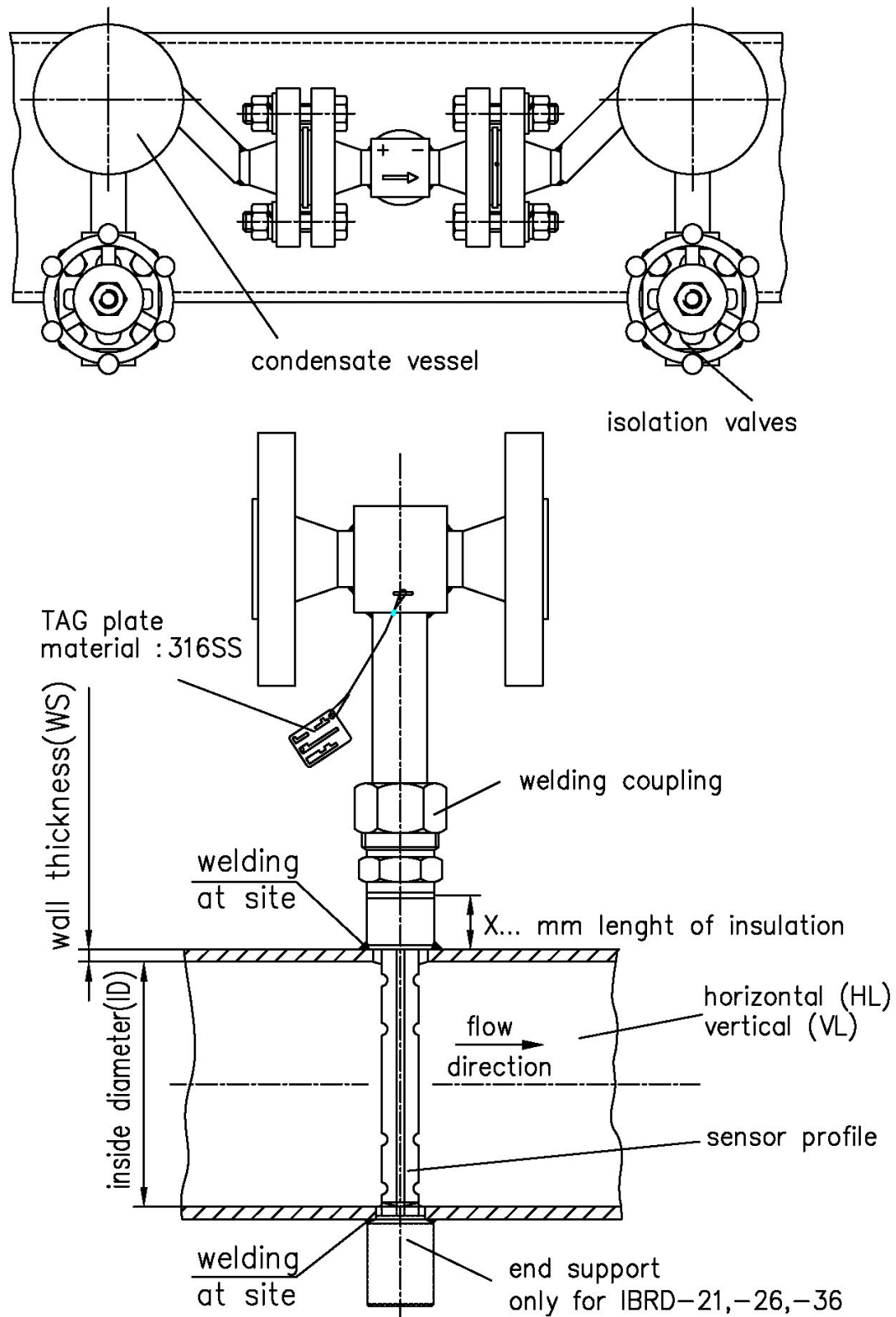


Fig 54: Itabar-Flow-Sensor to measure volumetric steam flow. The components: Threaded weld-o-let sensor head with flanges, condensate pots and screwed-on ANSI-slide valve 800 lbs.

b) Drawing for IBRD

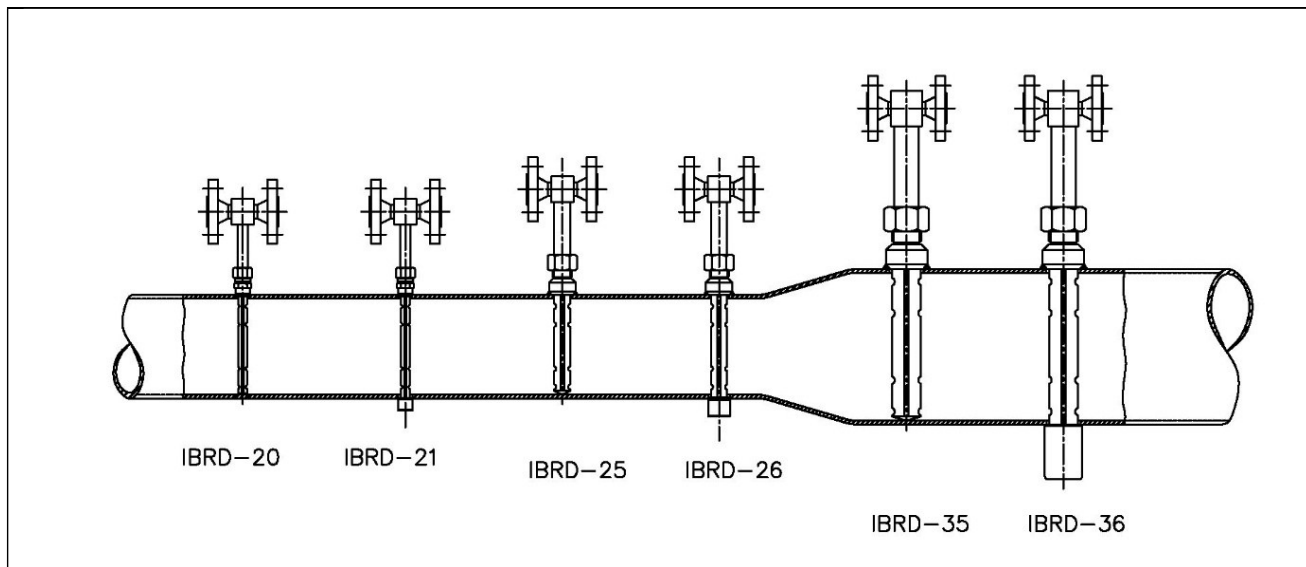
seperate installation of sensor and transmitter



Itabar-Flow-Sensors

c.) Order Data for Itabar® Series IBRD-20/21/25/26/35/36

c.1) Sensor type:



Pipe Size inches mm		Maximum Flow Volume m³/h					
		Sensor Type					
		IBRD -20	IBRD -21	IBRD -25	IBRD -26	IBRD -35	IBRD -36
1 ½	DN 40	52	123	---	---	---	---
2	DN 50	75	175	---	---	---	---
2 ¼	DN 65	114	264	---	---	---	---
2 ½	DN 80	156	355	---	---	---	---
4	DN 100	210	476	256	594	---	---
5	DN 125	---	---	341	784	---	---
6	DN 150	---	---	426	973	---	---
8	DN 200	---	---	595	1345	---	---
10	DN 250	---	---	776	1747	---	---
12	DN 300	---	---	970	2178	2004	4501
14	DN 350	---	---	1155	2592	2408	5399
16	DN 400	---	---	1335	2990	2813	6300
20	DN 500	---	---	1707	3820	3584	8018
24	DN 600	---	---	2069	4629	4369	9770
28	DN 700	---	---	2441	5461	5180	11580
32	DN 800	---	---	2835	6336	6009	13432

These values are for water of $\rho = 0,9982 \text{ kg/l}$ SGU and at a temperature $T = 20 \text{ °C}$. To calculate volumetric or mass flow of fluids with other densities see chapter 6 „Specifications of DP Sensors with WINFLOW“.

Selection and Specification of a Steam Flow Sensor P-max. 235,2 psi, T-max. 392°F

To be decided **by Customer** before Sensor selection

1. Remote mounting of DP transmitter – separate from the sensor (connections via Ermeto coupling, or compact version (DP transmitter integral with sensor))
2. Sensor to be equipped with integral PT100 temperature sensor

Existing process data:

Pipe size (ID) and pipe wall thickness, pipe material
Pipe configuration at sensor location; insulation of pipe (thickness)
Flow volume
Process pressure (abs.)
Process temperature

Example:

1. Pipe ID: 13,64 inches, wall thickness: 0,18 inches
2. Pipe material : C.S. (St 35.8)
3. Insulation: 3,94 inches
4. Pipe configuration: horizontal
5. Flow max. 35000 kg/h (saturated steam)
6. Pressure: 6 bar A (88,2 PSI/ abs.)
7. Temperature 158,85°C (317.93°F)
8. Selected option : integrated PT-100 temperature sensor

The sensor type IBRD-25 or IBRD-26 are selected via the pipe diameter in the table on page 117,. The Winflow program supplies information about the sensor type.

The above mentioned Winflow calculation will determine sensor type IBRD-25. The differential pressure according to process data entered is 40,3 mbar.

Sensor type IBRD-25 can be used up to a max. flow of (lb/hr) 57310 kg/h. Should the flow volume be higher than allowed for the selected sensor the WINFLOW program will issue a message: "Please select another sensor type". The customer can then for example select a sensor type IBRD-26 (w/end support).

Order code example:

IBRD-25-ID346,6/4,5mm-S-1-0-K1-C-X100-HL-TA-A81

INTRA-AUTOMATION GmbH

D-41515 Grevenbroich * Otto-Hahn-Str. 20 * Tel: +49 2181-68761 * Fax: +49 2181-64492

WINFLOW 2.75 (I) Diff. Pressure Calculation ITABAR - Flow - Sensor

Company: Mustermann
 Name(capital letters):
 Street:
 Zip Code/City:
 Offer-/Com. No:
 P. Order Number:
 Tag No.:
 Serial No.:
 Pipe Data: ID= 346,600/4,500 mm - horizontal
 Date: 18.04.2002
 Person in charge U.P.

Calculation: Mass rate Gas & steam
 Fluid: Saturated steam

Pipe Internal Dimensions: 346,600 mm
 Flowing Temperature: 158,850 °C
 Flowing Pressure: 6,000 bar A
 Density: 3,167 kg/m³
 Viscosity: 0,0140 cPs
 K-Factor: 0,6345 without unit

Base Temperature	273,15 Kelvin
Base Pressure	101,30 kPa

	QMax	QNorm	QMin	
Flow Rate	35.000,00	28.000,00	7.000,00	kg/H
Reynolds No.	2.550.490	2.040.392	510.098	without unit
Permanent press. loss	3,290	2,100	0,130	mbar
Expansionsfactor	0,999	0,999	1,000	without unit
Velocity:	32,53	26,03	6,51	m/sec.
Differential Pressure	40,381	25,828	1,613	mbar

Itabar-Type: IBRD-25-346,6/4,5mm-S-1-0-K1-C-X100-HL-TA-A81
 Material Sensor:
 Note:

Max. DeltaP	112,70 mbar	Max. Flow Rate	58.521,05 kg/H
Natural Freq.:	145,24 hz	Operat. Freq.:	101,44 hz

d) Order Specifications Itabar-Flow-Sensors, Series IBRD

d1) IBRD-20/21

ITABAR®-FLOW-SENSOR for Steam, threaded connection.	
Code	Description
1. Type:	
IBRD-20	Sensor Ø12mm prepared for cutting ring process connection (max. PN40) for steam without end support
IBRD-21	Sensor Ø12mm prepared for cutting ring process connection (max. PN40) for steam with end support
2. Pipe (duct) size: (ID/WT):	
DN040	DN 40 / 1-1/2"
DN050	DN 50 / 2"
DN065	DN 65 / 2-1/2"
DN080	DN 80 / 3"
DN100	DN 100 / 4"
Y9	others, please specify
3. Material sensor:	
V	1.4571 / 316Ti
Y	Special design
4. Welding coupling:	
000	without
001	material: C22.8 (similar A105)
003	material: 1.4571 / 316Ti
031	material: C22.8 (similar A105) with saddle plate, material: 1.4571/1.4301
041	material: C22.8 (similar A105) w/ saddle plate, material: 1.4571/1.4301 w. rubber gasket
033	material: 1.4571 / 316Ti with saddle plate, material: 1.4571/1.4301
043	material: 1.4571 / 316Ti with saddle plate, material: 1.4571/1.4301 w. rubber gasket
Y9	Special design
5. End support:	
00	without
01	material: C22.8 (similar A105)
03	material: 1.4571/316Ti
11	material: C22.8 (similar A105) with saddle plate, material: 1.4571/1.4301
21	material: C22.8 (similar A105) w/ saddle plate, material: 1.4571/1.4301 w. rubber gasket
13	material: 1.4571 / 316Ti with saddle plate, material: 1.4571/1.4301
23	material: 1.4571 / 316Ti with saddle plate, material: 1.4571/1.4301 w. rubber gasket
Y9	Special design
6. Pipe insulation:	
KI	without
X	insulation in mm (min. 50mm)
Y	Special design
7. Pipe run / flow direction:	
HL	horizontal, left
HR	horizontal, right
VD	vertical, down
VU	vertical, upwards
Y9	Special design
8. Integrated temperature sensor:	
T0	without
TA	3-wire, RTD -50 up to 400°C, without Ex approval, Sensor diameter=Ø0.5mm
TB	3-wire, RTD -50 up to 400°C, with Ex approval, Sensor diameter=Ø0.5mm
TC	thermocouple type K with INT5334-A3B non-ex-version; 4...20 mA output
TX	sensor prepared for PT100, probe diameter = Ø0.5mm (customer provision)
Y	Special design

Please see next page

Itabar-Flow-Sensors

IBRD-20/21 continuation	
Code	Description
8.1 Head transmitter for integrated RTD:	
0	without
2	4...20 mA / without Ex approval
3	4...20 mA + HART / without Ex approval
4	Profibus PA / without Ex approval
5	Foundation Fieldbus / without Ex approval
6	4...20 mA /ATEX Ex ia
7	4...20 mA + HART / ATEX Ex ia
8	Profibus PA / ATEX Ex ia
9	Foundation Fieldbus / ATEX Ex ia
Y	Special design
9. Condensate vessels:	
A00	without
K1H	flanged condensate pots; Ø88,9x5mm; mat.: P265GH; PN100 (600#) (remote version)
W1H	welded condensate pots; Ø88,9x5mm; mat.: P265GH; PN100 (600#) (remote version)
K1S	flanged cond. pots; Ø88,9x5mm; mat.: 316Ti (1.4571); 600# (PN100) (remote version)
F1S	welded cond. pots; Ø88,9x5mm; mat.: 316Ti (1.4571); 600# (PN100) (remote version)
A1H	welded cond. pots; Ø88,9x5mm; mat.: heavy boiler pl (HII); 600# (PN100) (comp. vers.)
A1S	welded cond. pots; Ø88,9x5mm; mat.: 316Ti(1.4571); 600# (PN100) (comp. vers.)
Y99	Special design
10. Differential pressure connection:	
A03	1 pair of nozzles, MNPT1/2" (remote version)
AS2	1 pair welding connection Ø21.3x3,2mm - welding end (remote version)
AS3	1 pair welding connection Ø21.3x6,3mm - welding end (remote version)
A06	IEC 61518; PTFE gasket (compact version)
A16	IEC 61518; Viton gasket (compact version)
Y99	Special design
11. Shut-off valve for remote version (initial shut-off):	
A00	without
A62	1 pair valve, PN400, housing: SS316/316L, female 1/2" NPT, packing: Graphite
A81	1 pair gate valve 800lbs. housing: A105, female 1/2" NPT, packing: Graphite
A82	1 pair gate valve 800lbs. housing: 316SS, female 1/2" NPT, packing: Graphite
AV1	1 pair valve, PN400, housing: C22.8 (A105), Ø21,3x6,3/Ø14,0x2,5 , packing: Graphite
AV2	1 pair valve, PN400, housing: 1.4571 (316Ti), Ø21,3x6,3/Ø14,0x2,5 , packing: Graphite
Y99	Special design
11.1 First Shut-off accessories:	
0	without
E12	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø12mm, mat.: 316SS
E14	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø14mm, mat.: 316SS
Y99	Special design
11.2 Manifold for remote variant:	
0	without
A65P	3-way-manifold, 316/316L, PN420 DN5, In/Out: 1/2"-NPTF/IEC61518-A, packing: PTFE
A70P	5-way-manifold, 316/316L PN420 DN5, In/Out: 1/2"-NPTF/IEC61518-A, packing: PTFE
Y99	Special design

Please see next page

IBRD-20/21 continuation	
Code	Description
10.2.1 Mounting set for remote version (manifold):	
0	without
MBC	mounting set, CS zinc-plated, for 2" pipe mntg, incl. screws 7/16-UNF/ FPM90-O-Ring
MBS	mounting set, sainless steel, for 2" pipe mntg, incl. screws 7/16-UNF/ FPM90-O-Ring
Y99	Special design
10.2.2 Accessories for manifold:	
0	without
E12	1 pair Ermeto-screw joints 1/2" NPT-M on Ø12mm, mat.: 316SS
E14	1 pair Ermeto-screw joints 1/2" NPT-M on Ø14mm, mat.: 316SS
Y99	Special design
11. Manifold for compact variant:	
A000	without
A66M	3-way-manifold, IEC 61518, material: 1.4404 (316L), pckg: PTFE, screws M10
A66U	3-way-manifold, IEC 61518, material: 1.4404 (316L), pckg: PTFE, screws 7/16-UNF
A71M	5-way-manifold, IEC 61518, material: 1.4404 (316L), pckg: PTFE, screws M10
A71U	5-way-manifold, IEC 61518, material: 1.4404 (316L), pckg: PTFE, screws 7/16-UNF
Y999	Special design
12. Special design/pre-assembly:	
0	without
M01	mounting of dp transmitter (customer provision)
M03	mounting of p transmitter (customer provision) with oval flange, mat. st.st.
A4	cleaned from oil+grease certificate
A5	oxygen service certificate
A6	PWIS free certificate (PWIS = paint-wetting impairment substances)
Y99	Special design

Itabar-Flow-Sensors

d2) IBRD-25/26

ITABAR®-FLOW-SENSOR for Steam, threaded connection.	
Code	Description
1. Type:	
IBRD-25	Sensor Ø25,4mm prepared for cutting ring process connection (max. PN40) for steam without end support
IBRD-26	Sensor Ø25,4mm prepared for cutting ring process connection (max. PN40) for steam with end support
2. Pipe (duct) size: (ID/WT):	
DN100	DN 100 / 4"
DN125	DN 125 / 5"
DN150	DN 150 / 6"
DN200	DN 200 / 8"
DN250	DN 250 / 10"
DN300	DN 300 / 12"
DN350	DN 350 / 14"
DN400	DN 400 / 16"
DN450	DN 450 / 18"
DN500	DN 500 / 20"
DN600	DN 600 / 24"
DN700	DN 700 / 28"
DN800	DN 800 / 32"
DN900	DN 900 / 36"
DN1000	DN 1000 / 40"
DN1100	DN 1100 / 44"
DN1200	DN 1200 / 48"
DN1400	DN 1400 / 56"
DN1600	DN 1600 / 64"
DN1800	DN 1800 / 72"
DN2000	DN 2000 / 80"
Y9	others, please specify
3. Material sensor:	
S	1.4404 / 316L
V	1.4571 / 316Ti
Y	Special design
4. Welding coupling:	
000	without
001	material: C22.8 (similar A105)
002	material: 1.4404 / 316L
003	material: 1.4571 / 316Ti
031	material: C22.8 (similar A105) with saddle plate, material: 1.4571/1.4301
041	material: C22.8 (similar A105) with saddle plate, mat.: 1.4571/1.4301 w. rubber gasket
032	material: 1.4404 / 316L with saddle plate, material: 1.4571/1.4301
042	material: 1.4404 / 316L with saddle plate, material: 1.4571/1.4301 w. rubber gasket
033	material: 1.4571 / 316Ti with saddle plate, material: 1.4571/1.4301
043	material: 1.4571 / 316Ti with saddle plate, material: 1.4571/1.4301 w. rubber gasket
Y9	Special design

Please see next page

IBRD-25/26 continuation	
Code	Description
5. End support:	
00	without
01	material: C22.8 (similar A105)
02	material: 1.4404 / 316L
03	material: 1.4571 / 316Ti
11	material: C22.8 (similar A105) with saddle plate, material: 1.4571/1.4301
21	material: C22.8 (similar A105) with saddle plate, mat.: 1.4571/1.4301 w. rubber gasket
12	material: 1.4404 / 316L with saddle plate, material: 1.4571/1.4301
22	material: 1.4404 / 316L with saddle plate, material: 1.4571/1.4301 w. rubber gasket
13	material: 1.4571 / 316Ti with saddle plate, material: 1.4571/1.4301
23	material: 1.4571 / 316Ti with saddle plate, material: 1.4571/1.4301 w. rubber gasket
Y9	Special design
6. Pipe insulation:	
KI	without
X	insulation in mm (min. 50mm)
Y	Special design
7. Pipe run / flow direction:	
HL	horizontal, left
HR	horizontal, right
VD	vertical, down
VU	vertical, upwards
Y9	Special design
8. Integrated temperature sensor:	
T0	without
TA	3-wire, RTD -50 bis 400°C, without Ex approval, Sensor diameter=Ø3,0mm
TB	3-wire, RTD -50 bis 400°C, Ex approval, Sensor diameter=Ø3,0mm
TC	thermocouple type K with INT5334-A3B non-ex-version; 4...20 mA output
TX	sensor prepared for PT100, probe diameter = Ø3,0mm (customer provision)
Y	Special design
8.1 Head transmitter for integrated RTD:	
0	without
2	4...20 mA / without Ex approval
3	4...20 mA + HART / without Ex approval
4	Profibus PA / without Ex approval
5	Foundation Fieldbus / without Ex approval
6	4...20 mA / ATEX Ex ia
7	4...20 mA + HART / ATEX Ex ia
8	Profibus PA / ATEX Ex ia
9	Foundation Fieldbus / ATEX Ex ia
Y	Special design

Please see next page

Itabar-Flow-Sensors

IBRD-25/26 continuation	
Code	Description
9. Condensate vessels:	
A03	Without
AS2	flanged cond. pots; Ø88,9x5mm; mat.: P265GH; PN100 (600#) (remote version)
AS3	welded cond. pots; Ø88,9x5mm; mat.: P265GH; PN100 (600#) (remote version)
A06	flanged cond. pots; Ø88,9x5mm; mat.: 316Ti (1.4571); 600# (PN100) (remote version)
A16	welded cond. pots; Ø88,9x5mm; mat.: 316Ti (1.4571); 600# (PN100) (remote version)
A03	welded cond. pots; Ø88,9x5mm; mat.: heavy boiler plate (HII); 600#(PN100) (comp. vers.)
AS2	welded cond. pots; Ø88,9x5mm; mat.: 316Ti (1.4571); 600# (PN100) (compact version)
Y99	Special Design
10. Differential pressure connection:	
A03	1 pair of nozzles, MNPT1/2" (remote version)
AS2	2 pair of nozzles, MNPT1/2" (remote version)
AS3	3 pair of nozzles, MNPT1/2" (remote version)
A06	1 pair of nozzles, MNPT1/4" (remote version)
A16	2 pair of nozzles, MNPT1/4" (remote version)
Y99	Special design
11. Shut-off valve for remote version (initial shut-off):	
A00	without
A62	1 pair valve, PN400, housing: SS316/316L, female 1/2" NPT, packing: Graphite
A81	1 pair gate valve 800lbs. housing: A105, female 1/2" NPT, packing: Graphite
A82	1 pair gate valve 800lbs. housing: 316SS, female 1/2" NPT, packing: Graphite
AV1	1 pair valve, PN400, housing: C22.8 (A105), Ø21,3x6,3/Ø14,0x2,5 , packing: Graphite
AV2	1 pair valve, PN400, housing: 1.4571 (316Ti), Ø21,3x6,3/Ø14,0x2,5 , packing: Graphite
Y99	Special design
11.1 First Shut-off accessories:	
0	without
E12	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø12mm, mat.: 316SS
E14	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø14mm, mat.: 316SS
Y99	Special design
11.2 Manifold for remote variant:	
0	without
A65P	3-way-manifold, 316/316L, PN420 DN5, In/Out: 1/2"-NPTF/IEC61518-A, packing: PTFE
A70P	5-way-manifold, 316/316L PN420 DN5, In/Out: 1/2"-NPTF/IEC61518-A, packing: PTFE
Y99	Special design
11.2.1 Mounting set for remote version (manifold):	
0	without
MBC	mounting set, CS zinc-plated, for 2" pipe mtg, incl. screws 7/16-UNF/ FPM90-O-Ring
MBS	mounting set, stainless steel, for 2" pipe mounting, incl. screws 7/16-UNF/ FPM90-O-Ring
Y99	Special design
Y99	Special design
11.2.2 Accessories for c	
0	without
E12	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø12mm, mat.: 316SS
E14	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø14mm, mat.: 316SS
Y99	Special design

Please see next page

IBRD-25/26 continuation	
Code	Description
12. Valve block for compact variant:	
A000	without
A66M	3-way-manifold, IEC 61518, material: 1.4404 (316L), packing: PTFE, screws M10
A66U	3-way-manifold, IEC 61518, material: 1.4404 (316L), packing: PTFE, screws 7/16-UNF
A71M	5-way-manifold, IEC 61518, material: 1.4404 (316L), packing: PTFE, screws M10
A71U	5-way-manifold, IEC 61518, material: 1.4404 (316L), packing: PTFE, screws 7/16-UNF
Y999	Special design
13. Special design/pre-assembly:	
0	without
M01	mounting of dp transmitter (customer provision)
M03	mounting of p transmitter (customer provision) with oval flange, mat. st.st.
A4	cleaned from oil+grease certificate
A5	oxygen service certificate
A6	PWIS free certificate (PWIS = paint-wetting impairment substances)
SPA	1/8" NPTF cleaning ports + plug
Y99	Special design

Itabar-Flow-Sensors

d) Order Data for IBRD-35/36

ITABAR®-FLOW-SENSOR for Steam, threaded connection.	
Code	Description
1. Type:	
IBR-D-35	Sensor Ø42mm prepared for cutting ring process connection (max. PN40) for steam without end support
IBRD-36	Sensor Ø42mm prepared for cutting ring process connection (max. PN40) for steam with end support
2. Pipe (duct) size: (ID/WT):	
DN200	DN 200 / 8"
DN250	DN 250 / 10"
DN300	DN 300 / 12"
DN350	DN 350 / 14"
DN400	DN 400 / 16"
DN450	DN 450 / 18"
DN500	DN 500 / 20"
DN600	DN 600 / 24"
DN700	DN 700 / 28"
DN800	DN 800 / 32"
DN900	DN 900 / 36"
DN1000	DN 1000 / 40"
DN1100	DN 1100 / 44"
DN1200	DN 1200 / 48"
DN1400	DN 1400 / 56"
DN1600	DN 1600 / 64"
DN1800	DN 1800 / 72"
DN2000	DN 2000 / 80"
Y9	others, please specify
3. Material sensor:	
S	1.4404 / 316L
V	1.4571 / 316Ti
Y	Special design
4. Welding coupling:	
000	without
001	material: C22.8 (similar A105)
002	material: 1.4404 / 316L
003	material: 1.4571 / 316Ti
031	material: C22.8 (similar A105) with saddle plate, material: 1.4571/1.4301
041	material: C22.8 (similar A105) with saddle plate, mat.: 1.4571/1.4301 w. rubber gasket
032	material: 1.4404 / 316L with saddle plate, material: 1.4571/1.4301
042	material: 1.4404 / 316L with saddle plate, material: 1.4571/1.4301 w. rubber gasket
033	material: 1.4571 / 316Ti with saddle plate, material: 1.4571/1.4301
043	material: 1.4571 / 316Ti with saddle plate, material: 1.4571/1.4301 w. rubber gasket
Y9	Special design

Please see next page

IBRD-35/36 continuation	
Code	Description
5. End support:	
00	without
01	material: C22.8 (similar A105)
02	material: 1.4404 / 316L
03	material: 1.4571 / 316Ti
11	material: C22.8 (similar A105) with saddle plate, material: 1.4571/1.4301
21	material: C22.8 (similar A105) with saddle plate, mat.: 1.4571/1.4301 w. rubber gasket
12	material: 1.4404 / 316L with saddle plate, material: 1.4571/1.4301
22	material: 1.4404 / 316L with saddle plate, material: 1.4571/1.4301 w. rubber gasket
13	material: 1.4571 / 316Ti with saddle plate, material: 1.4571/1.4301
23	material: 1.4571 / 316Ti with saddle plate, material: 1.4571/1.4301 w. rubber gasket
Y9	Special design
6. Pipe insulation:	
KI	without
X	insulation in mm (min. 50mm)
Y	Special design
7. Pipe run / flow direction:	
HL	horizontal, left
HR	horizontal, right
VD	vertical, down
VU	vertical, upwards
Y9	Special design
8. Integrated temperature sensor:	
T0	without
TA	3-wire, RTD -50 bis 400°C, without Ex approval, Sensor diameter=Ø3,0mm
TB	3-wire, RTD -50 bis 400°C, Ex approval, Sensor diameter=Ø3,0mm
TC	thermocouple type K with INT5334-A3B non-ex-version; 4...20 mA output
TX	sensor prepared for PT100, probe diameter = Ø3,0mm (customer provision)
Y	Special design
8.1 Head transmitter for integrated RTD:	
0	without
2	4...20 mA / without Ex approval
3	4...20 mA + HART / without Ex approval
4	Profibus PA / without Ex approval
5	Foundation Fieldbus / without Ex approval
6	4...20 mA / ATEX Ex ia
7	4...20 mA + HART / ATEX Ex ia
8	Profibus PA / ATEX Ex ia
9	Foundation Fieldbus / ATEX Ex ia
Y	Special design

Please see next page

Itabar-Flow-Sensors

IBRD-35/36 continuation	
Code	Description
9. Differential pressure connection:	
A00	Without
K1H	flanged cond. pots; Ø88,9x5mm; mat.: P265GH; PN100 (600#) (remote version)
W1H	welded cond. pots; Ø88,9x5mm; mat.: P265GH; PN100 (600#) (remote version)
K1S	flanged cond. pots; Ø88,9x5mm; mat.: 316Ti (1.4571); 600# (PN100) (remote version)
F1S	welded cond. pots; Ø88,9x5mm; mat.: 316Ti (1.4571); 600# (PN100) (remote version)
A1H	welded cond. pots; Ø88,9x5mm; mat.: heavy boiler plate (HII); 600# (PN100) (comp. version)
A1S	welded cond. pots; Ø88,9x5mm; mat.: 316Ti (1.4571); 600# (PN100) (compact version)
Y99	Special design
10. Differential pressure connection:	
A03	1 pair of nozzles, MNPT1/2" (remote version)
AS2	1 pair welding connection Ø21.3x3,2mm - welding end (remote version)
AS3	1 pair welding connection Ø21.3x6,3mm - welding end (remote version)
A06	IEC 61518; PTFE gasket (compact version)
A16	IEC 61518; Viton gasket (compact version)
Y99	Special design
11. Shut-off valve for remote version (initial shut-off):	
A00	without
A62	1 pair valve, PN400, housing: SS316/316L, female 1/2" NPT, packing: Graphite
A81	1 pair gate valve 800lbs. housing: A105, female 1/2" NPT, packing: Graphite
A82	1 pair gate valve 800lbs. housing: 316SS, female 1/2" NPT, packing: Graphite
AV1	1 pair valve, PN400, housing: C22.8 (A105), Ø21,3x6,3/Ø14,0x2,5 , packing: Graphite
AV2	1 pair valve, PN400, housing: 1.4571 (316Ti), Ø21,3x6,3/Ø14,0x2,5 , packing: Graphite
Y99	Special design
11.1 First Shut-off accessories:	
0	without
E12	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø12mm, mat.: 316SS
E14	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø14mm, mat.: 316SS
Y99	Special design
11.2 Manifold for remote variant:	
0	without
A65P	3-way-manifold, 316/316L, PN420 DN5, In/Out: 1/2"-NPTF/IEC61518-A, packing: PTFE
A70P	5-way-manifold, 316/316L PN420 DN5, In/Out: 1/2"-NPTF/IEC61518-A, packing: PTFE
Y99	Special design
11.2.1 Mounting set for remote version (manifold):	
0	without
MBC	mounting set, CS zinc-plated, for 2" pipe mtg, incl. screws 7/16-UNF/ FPM90-O-Ring
MBS	mounting set, stainless steel, for 2" pipe mounting, incl. screws 7/16-UNF/ FPM90-O-Ring
Y99	Special design
11.2.2 Accessories for manifold:	
0	without
E12	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø12mm, mat.: 316SS
E14	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø14mm, mat.: 316SS
Y99	Special design

Please see next page

IBRD-35/36 continuation	
Code	Description
11. Valve block for compact variant:	
A000	without
A66M	3-way-manifold, IEC 61518, material: 1.4404 (316L), packing: PTFE, screws M10
A66U	3-way-manifold, IEC 61518, material: 1.4404 (316L), packing: PTFE, screws 7/16-UNF
A71M	5-way-manifold, IEC 61518, material: 1.4404 (316L), packing: PTFE, screws M10
A71U	5-way-manifold, IEC 61518, material: 1.4404 (316L), packing: PTFE, screws 7/16-UNF
Y999	Special design
12. Special design/pre-assembly:	
0	without
M01	mounting of dp transmitter (customer provision)
M03	mounting of p transmitter (customer provision) with oval flange, mat. st.st.
A4	cleaned from oil+grease certificate
A5	oxygen service certificate
A6	PWIS free certificate (PWIS = paint-wetting impairment substances)
SPA	1/8" NPTF cleaning ports + plug
Y99	Special design

Itabar-Flow-Sensors

e) Picture of Condensate Pots

Material	Wall thickness [mm]	Medium temperature (°F / °C)					
		572 / 300	662 / 350	752 / 400	842 / 450	932 / 500	1022 / 550
		Max. operation pressure (psi / bar)					
H11	5,0	1321 / 91,1	1221 / 84,2	1128 / 77,8	1083 / 74,7	-/-	-/-
316 Ti	5,0	1336 / 92,1	1289 / 88,9	1242 / 85,7	1206 / 83,2	1187 / 81,9	1169 / 80,6
316 L	5,0	1321 / 91,1	1221 / 84,2	1128 / 77,8	1083 / 74,7	-/-	-/-
15Mo3	5,0	1580 / 109,0	1488 / 102,6	1396 / 96,3	1350 / 93,1	1303 / 89,9	1242 / 85,7



Fig 55: condensate pot, Ø 88,9 x 3,2 mm

f) Pressure-Temperature Tables for Shut-Off Valves

Code	Max. operation pressure at temperature													°F
	32	212	302	392	482	572	662	752	797	842	887	932	1022	
	0	100	150	200	250	300	350	400	425	450	475	500	510	°C
A81	1987	1929	1885	1841	1775	1581	1362	1160	1001	827	624	-	-	psi
	137	133	130	127	121	109	96	80	69	57	43	-	-	bar
A82	2002	1929	1885	1841	1755	1581	1407	1291	1233	1189	1088	972	855	psi
	138	133	130	127	121	109	97	89	85	82	75	-	-	bar



Fig: 56 construction of small gate valve

IB*D

C.2 Itabar for Steam (fixed installation)

IBFD

C.2.2 Itabar with flanged process connection

Types: IBFD-20/21/25/26/35/36/ (up to 1450 psi and 842 °F)

a.) Description

The ITABAR-sensor series IBFD is designed to measure the flow of saturated and superheated steam. The installation assembly includes a flanged connection and thus allows the sensor to be used in high pressure applications (to 1450psi [100 bar]). The maximum possible temperature is 842°F (450°C). The standard sensor material is 316 st steel (1.4571)

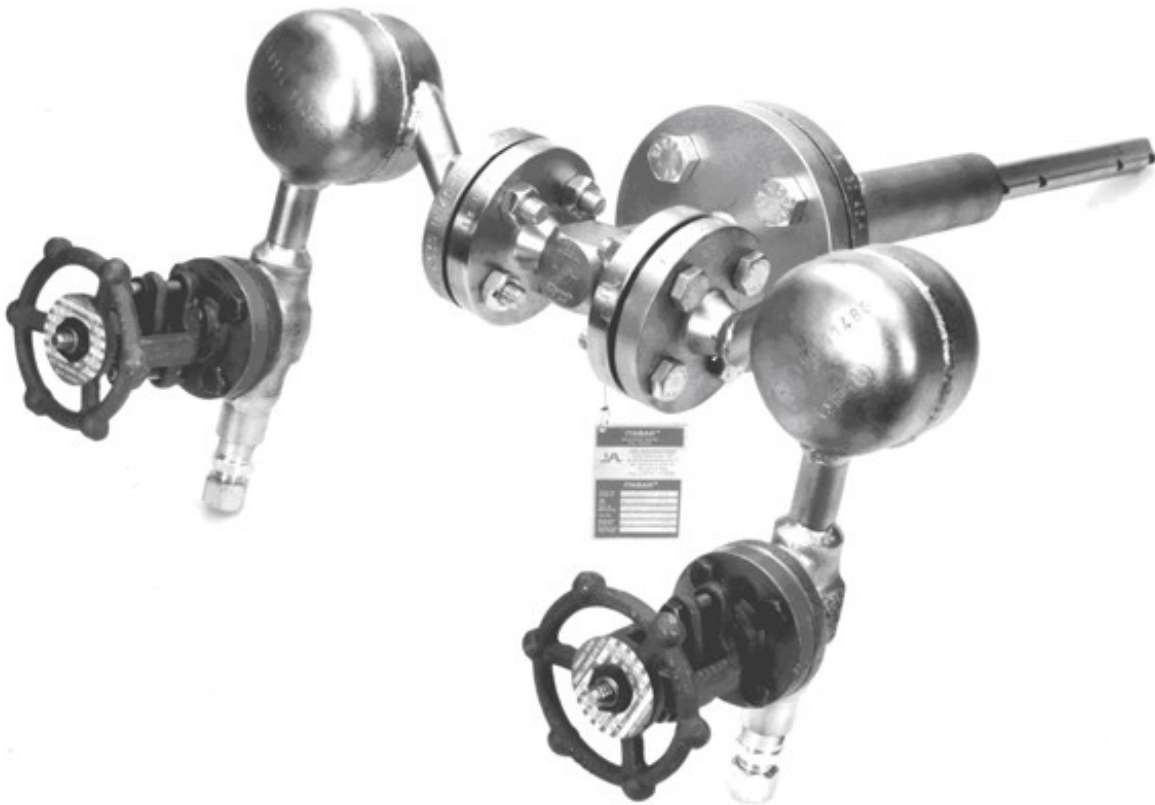
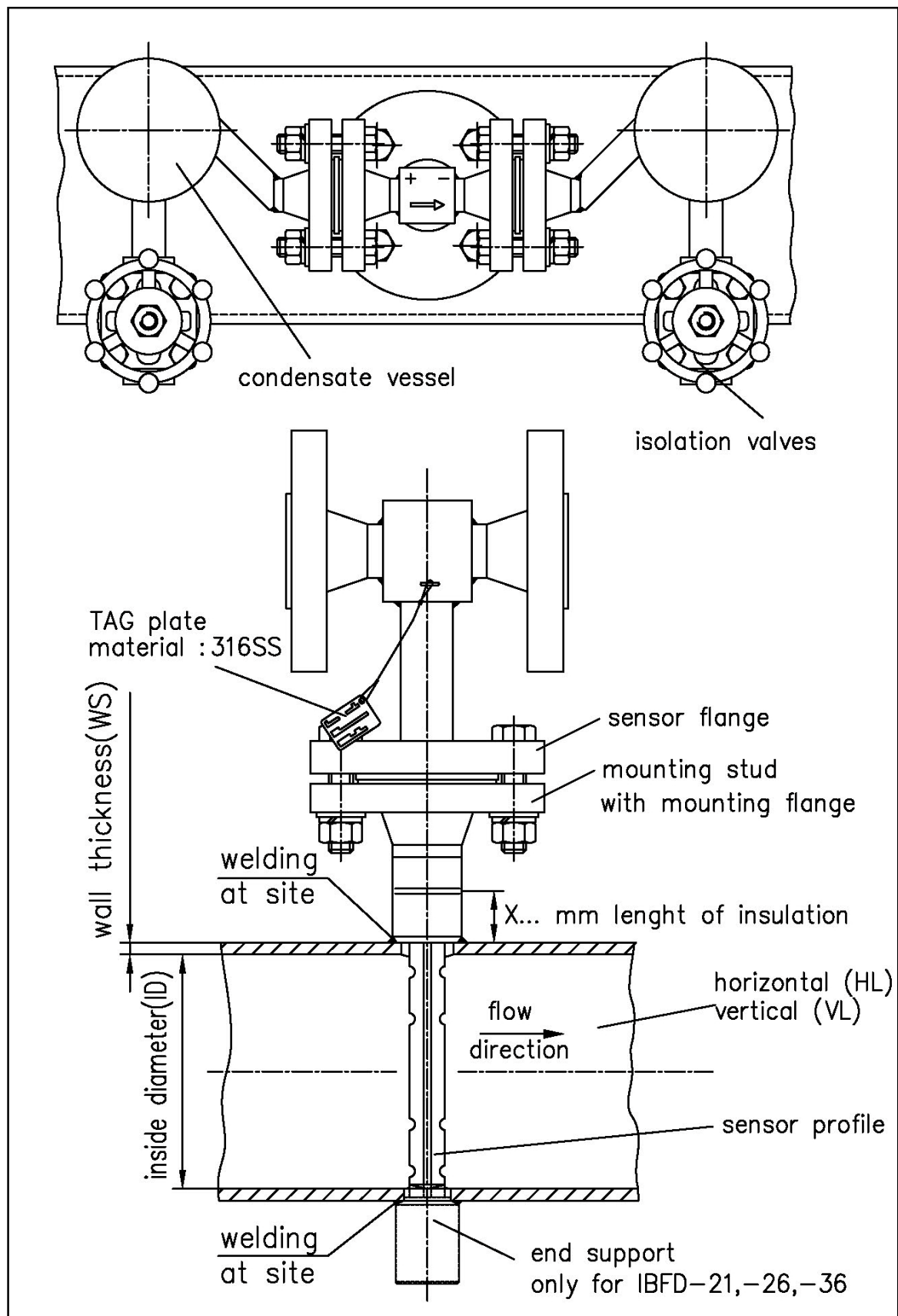


Fig 57: Itabar IBFD with flanged condensate pots to measure superheated steam.

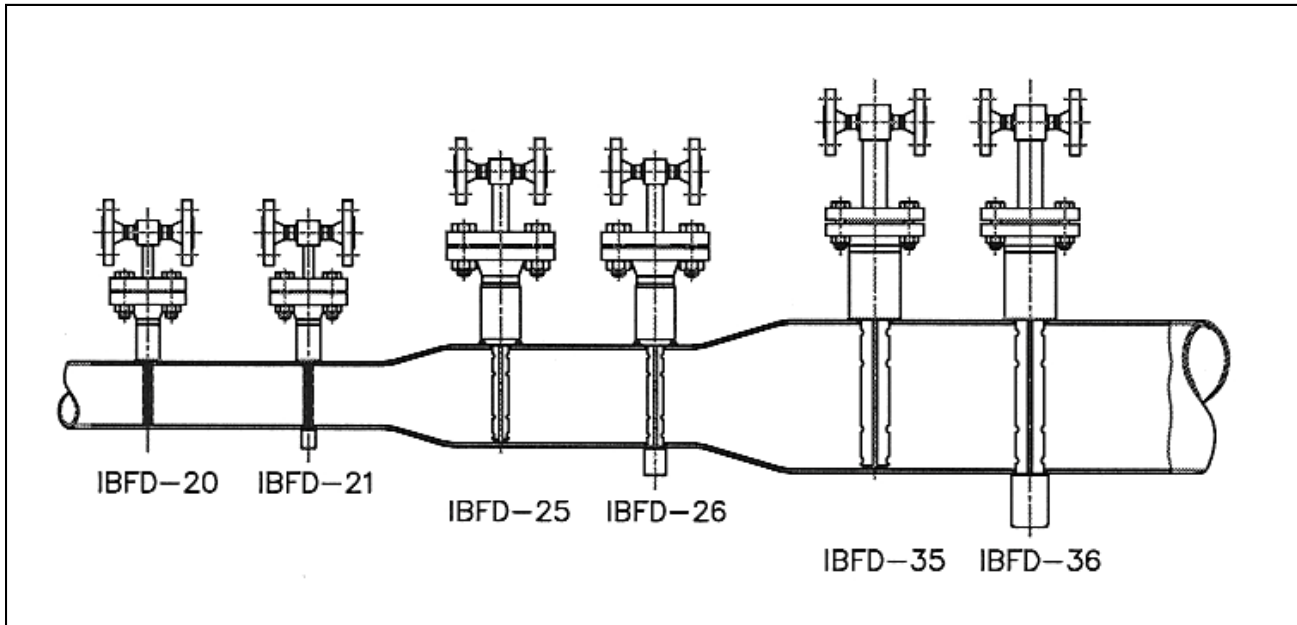
Itabar-Flow-Sensors

b) Drawing for IBFD



c.) Order Data for Itabar® Series IBFD-20/21/25/26/35/36

c.1) Sensor type:



Pipe ID inches mm		Maximum Flow Volume m ³ /h					
		IBFD - 20	IBFD - 21	IBFD - 25	IBFD - 26	IBFD - 35	IBFD - 36
1 ½	DN 40	29	114	---	---	---	---
2	DN 50	59	161	---	---	---	---
2 ¼	DN 65	95	243	---	---	---	---
2 ½	DN 80	130	328	---	---	---	---
4	DN 100	179	439	205	544	---	---
5	DN 125	238	570	281	719	---	---
6	DN 150	---	---	358	894	---	---
8	DN 200	---	---	61	1242	---	---
10	DN 250	---	---	687	1623	---	---
12	DN 300	---	---	872	2034	1757	4204
14	DN 350	---	---	1053	2433	2142	5067
16	DN 400	---	---	1226	2818	2532	5942
20	DN 500	---	---	1592	3627	3283	7611
24	DN 600	---	---	1949	4420	4052	9327
28	DN 700	---	---	2318	5237	4846	11106
32	DN 800	---	---	2701	6099	7937	12930
36	DN 900	---	---	---	7000	---	14790
40	DN 1000	---	---	---	7921	---	16674

These values are for water of $\rho = 0,9982 \text{ kg/l}$ SGU and at a temperature $T = 20 \text{ }^{\circ}\text{C}$. To calculate volumetric or mass flow of fluids with other densities see chapter 6 „Specifications of DP Sensors with WINFLOW“.

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d) Order Specifications Itabar Flow Sensors, Series IBFD

d1) IBFD-20/21

ITABAR®-FLOW-SENSOR for Steam, flanged connection.	
Code	Description
1. Type:	
IBFD-20	Sensor Ø12mm prepared for flanged process connection; for steam without end support
IBFD-21	Sensor Ø12mm prepared for flanged process connection; for steam with end support
2. Pipe (duct) size: (ID/WT):	
DN040	DN 40 / 1-1/2"
DN050	DN 50 / 2"
DN065	DN 65 / 2-1/2"
DN080	DN 80 / 3"
DN100	DN 100 / 4"
Y9	others, please specify
3. Material sensor:	
V	1.4571 / 316Ti
Y	others, please specify
4. Process connection:	
00	without
FA	flanged connection
Y	others, please specify
4.1 Standard:	
E	EN 1092-1
A	ASME B 16.5
D	DIN (according to type & pressure rating)
Y	others, please specify
4.2 Nominal size:	
A23	DN25
AGG	1"
Y9	others, please specify
4.3 Pressure class:	
C	PN16
D	PN40
E	PN63
F	PN100
G	PN160
H	PN250
I	PN320
J	PN400
K	150 lbs.
L	300 lbs.
M	600 lbs.
N	900 lbs.
O	1500 lbs.
P	2500 lbs.
Y9	others, please specify

Please see next page

IBFD-20/21 continuation	
Code	Description
4.4 Flange face process connection flange:	
E0	EN 1092-1 Form A (without sealing strip; Ra 3.2-12.5µm)
E1	EN 1092-1 Form B1 (raised sealing strip; Ra 3,2-12,5µm)
E2	EN 1092-1 Form B2 (raised sealing strip; Ra 0,8-3,2µm)
E3	EN 1092-1 Form C (tongue; Ra 0,8-3,2µm)
E4	EN 1092-1 Form D (groove; Ra 0,8-3,2µm)
A1	ASME B 16.5 Raised Face (RF)
A2	ASME B 16.5 Raised Face Smooth Finish (RFSF)
A3	ASME B 16.5 Flat Face (FF)
A4	ASME B 16.5 Ring-Type Joint (RTJ)
A5	ASME B 16.5 Tongue (ASME)
A6	ASME B 16.5 Groove (ASME)
D1	DIN Form A (without special demand)
D2	DIN Form B (raised sealing strip ; Rz = 160µm)
D3	DIN Form C (raised sealing strip ; Rz = 160µm)
D4	DIN Form D (raised sealing strip ; Rz = 40µm)
D5	DIN Form E (raised sealing strip ; Rz = 16µm)
D6	DIN Form F (tongue acc. DIN 2512)
D7	DIN Form N (groove acc. DIN 2512)
Y9	others, please specify
4.5 Gasket:	
0	without
B	Fibre-reinforced flat gasket; Klingsil C4400, thickness: 2 mm; max. 200°C (392°F)
C	Spiral wound gasket w/ IR(316)&AR(CS) filling graphite; thickn.: 4. mm; max. 450°C (842°F)
D	Sp.wnd gasket w/ IR(316SS)&AR(316SS) filling graphite; thickn.: 4.5mm; max.450°C (842°F)
RO	Ring-Joint Seal Type R-Oval ASME B16.20
Y9	others, please specify
4.6 Bolts / nuts:	
0	without
1	DIN931 (ISO 4014) hex-head screw with one nut; material: 5.6/5.2 (carbon steel zinc-plated)
2	DIN931 (ISO 4014) hex-head screw with one nut; material: A2-70 (stainless steel)
3	DIN 2510 Form L Material: 1.1181 / CK35
4	DIN 2510 Form L Material: 1.4301 / A2-70
5	ASME B16.5 Material: A193 Gr. B7 / A194 Gr. 2H (galvanised)
6	ASME B16.5 Material: A193 Gr. B8 Cl.1 / A194 Gr. 8
Y9	others, please specify
5. Design mounting part:	
0	without (provided by others / customer /)
R	mounting stud with flange (standard)
W0	weldolet assembly, stud with flange
Y9	others, please specify

Please see next page

Itabar-Flow-Sensors

IBFD-20/21 continuation	
Code	Description
5.1 Material mounting stud	
C	P250GH / A105
S	1.4404 / 316L
V	1.4571 / 316Ti
P	1.5415 / 16Mo3
E	1.7335 / 13CrMo44
F	1.7380 / 10CrMo910
Q	1.4903, X10CrMoVNb910
Y9	others, please specify
5.2 Standard:	
E	EN 1092-1
A	ASME B 16.5
D	DIN (according to type & pressure rating)
Y	others, please specify
5.3 Nominal size:	
A23	DN25
AGG	1"
Y9	others, please specify
5.4 Pressure class:	
C	PN16
D	PN40
E	PN63
F	PN100
G	PN160
H	PN250
I	PN320
J	PN400
K	150 lbs.
L	300 lbs.
M	600 lbs.
N	900 lbs.
O	1500 lbs.
P	2500 lbs.
Y9	andere, bitte spezifizieren

Please see next page

IBFD-20/21 continuation	
Code	Description
5.5 Flange face mounting stud flange:	
E0	EN 1092-1 Form A (without sealing strip; Ra 3.2-12.5µm)
E1	EN 1092-1 Form B1 (raised sealing strip; Ra 3,2-12,5µm)
E2	EN 1092-1 Form B2 (raised sealing strip; Ra 0,8-3,2µm)
E3	EN 1092-1 Form C (tongue; Ra 0,8-3,2µm)
E4	EN 1092-1 Form D (groove; Ra 0,8-3,2µm)
A1	ASME B 16.5 Raised Face (RF)
A2	ASME B 16.5 Raised Face Smooth Finish (RFSF)
A3	ASME B 16.5 Flat Face (FF)
A4	ASME B 16.5 Ring-Type Joint (RTJ)
A5	ASME B 16.5 Tongue (ASME)
A6	ASME B 16.5 Groove (ASME)
D1	DIN Form A (without special demand)
D2	DIN Form B (raised sealing strip ; Rz = 160µm)
D3	DIN Form C (raised sealing strip ; Rz = 160µm)
D4	DIN Form D (raised sealing strip ; Rz = 40µm)
D5	DIN Form E (raised sealing strip ; Rz = 16µm)
D6	DIN Form F (tongue acc. DIN 2512)
D7	DIN Form N (groove acc. DIN 2512)
Y9	others, please specify
6. End support:	
0	without
C	material: C22.8 (similar A105)
S	material: 1.4404 / 316L
V	material: 1.4571 / 316Ti
P	material: 1.5415 / 16Mo3
E	material: 1.7335 / 13CrMo44
F	material: 1.7380 / 10CrMo910
Q	material: 1.4903, X10CrMoVNb910
Y	others, please specify
7. Pipe insulation:	
KI	without
X	insulation in mm (min. 50mm)
Y	others, please specify
8. Pipe run/flow direction:	
HL	horizontal, left
HR	horizontal, right
VD	vertical, down
VU	vertical, upwards
Y9	others, please specify

Please see next page

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IBFD-20/21 continuation	
Code	Description
9. Integrated temperature sensor:	
T0	without
TA	3-wire,RTD -50 bis 400°C, without Ex approval, Sensor diameter=Ø0.5mm
TB	3-wire,RTD -50 bis 400°C, Ex approval, Sensor diameter=Ø0.5mm
TC	thermocouple type K with INT5334-A3B non-ex-version; 4...20 mA output
TX	sensor prepared for PT100, probe diameter = Ø0.5mm (customer provision)
Y	others, please specify
9.1 Head transmitter for integrated temperature sensor:	
0	without
2	4...20 mA / without Ex approval
3	4...20 mA + HART / without Ex approval
4	Profibus PA / without Ex approval
5	Foundation Fieldbus / without Ex approval
6	4...20 mA /ATEX Ex ia
7	4...20 mA + HART / ATEX Ex ia
8	Profibus PA / ATEX Ex ia
9	Foundation Fieldbus / ATEX Ex ia
Y	others, please specify
10. Condensate vessels:	
A00	without
K1H	flanged cond. pots; Ø88,9x5mm; mat.: P265GH; PN100 (600#) (remote version)
W1H	welded cond. pots; Ø88,9x5mm; mat.: P265GH; PN100 (600#) (remote version)
K1S	flanged cond. pots; Ø88,9x5mm; mat.: 316Ti (1.4571); 600# (PN100) (remote version)
F1S	welded cond. pots; Ø88,9x5mm; mat.: 316Ti (1.4571); 600# (PN100) (remote version)
A1H	welded cond. pots; Ø88,9x5mm; mat.: heavy poiler plate (HII); 600# (PN100) (comp. version)
A1S	welded cond. pots; Ø88,9x5mm; mat.: 316Ti (1.4571); 600# (PN100) (comp. version)
K1P	welded cond. pots; Ø90x17,5mm; Mat.: 1.5415 (16Mo3); High-pressure design
Y99	others, please specify
11. Differential pressure connection:	
A03	1 pair of nozzles, MNPT1/2" (remote version)
AS2	1 pair welding connection Ø21.3x3,2mm - welding end (remote version)
AS3	1 pair welding connection Ø21.3x6,3mm - welding end (remote version)
AS4	1 pair welding connection Ø24x4,0mm - welding end (remote version)
A06	IEC 61518; PTFE gasket
A16	IEC 61518; Viton gasket
Y99	others, please specify
12. Shut-off valve for remote version (initial shut-off):	
A00	without
A62	1 pair valve, PN400, housing: SS316/316L, female 1/2" NPT, packing: Graphite
A81	1 pair gate valve 800lbs. housing: A105, female 1/2" NPT, packing: Graphite
A82	1 pair gate valve 800lbs. housing: 316SS, female 1/2" NPT, packing: Graphite
AV1	1 pair valve, PN400, housing: C22.8 (A105),Ø21,3x6,3/Ø14,0x2,5 , packing: Graphite
AV2	1 pair valve, PN400, housing: 1.4571 (316Ti),Ø21,3x6,3/Ø14,0x2,5 , packing: Graphite
AV3	valve, PN400, housing: 1.5415 (16Mo3),Ø21,3x6,3/Ø14,0x2,5 , packing: Graphite
Y99	others, please specify

Please see next page

IBFD-20/21 continuation	
Code	Description
12.1 First Shut-off accessories:	
0	without
E12	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø12mm, mat.: 316SS
E14	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø14mm, mat.: 316SS
Y99	others, please specify
12.2 Manifold for remote version:	
0	without
A65P	3-way-manifold, 316/316L, PN420 DN5, In/Out: 1/2"-NPTF/IEC61518-A, pckg: PTFE
A70P	5-way-manifold, 316/316L PN420 DN5, In/Out: 1/2"-NPTF/IEC61518-A, pckg: PTFE
Y99	others, please specify
12.2.1 Mounting set for remote version (manifold):	
0	without
MBC	mounting set, CS zinc-plated, for 2" pipe mounting, incl. screws 7/16-UNF/ FPM90-O-Ring
MBS	mounting set, stainless steel, for 2" pipe mounting, incl. screws 7/16-UNF/ FPM90-O-Ring
Y99	others, please specify
12.2.2 Accessories for manifold:	
0	without
E12	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø12mm, mat.: 316SS
E14	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø14mm, mat.: 316SS
Y99	others, please specify
13. Valve block for compact version:	
A000	without
A66M	3-way-manifold, IEC 61518, material: 1.4404 (316L), packing: PTFE, screws M10
A66U	3-way-manifold, IEC 61518, material: 1.4404 (316L), packing: PTFE, screws 7/16-UNF
A71M	5-way-manifold, IEC 61518, material: 1.4404 (316L), packing: PTFE, screws M10
A71U	5-way-manifold, IEC 61518, material: 1.4404 (316L), packing: PTFE, screws 7/16-UNF
Y999	others, please specify
14. Special design/pre-assembly:	
0	without
M01	mounting of dp transmitter (customer provision)
M03	mounting of p transmitter (customer provision) with oval flange, mat. st.st.
A4	cleaned from oil+grease certificate
A5	oxygen service certificate
A6	PWIS free certificate (PWIS = paint-wetting impairment substances)
Y99	others, please specify

Itabar-Flow-Sensors

d) Order Data for IBFD-25/26

ITABAR®-FLOW-SENSOR for Steam, flanged connection.	
Code	Description
1. Type:	
IBFD-25	Sensor Ø25,4mm prepared for flanged process connection; for steam without end support
IBFD-26	Sensor Ø25,4mm prepared for flanged process connection; for steam with end support
2. Pipe (duct) size: (ID/WT):	
DN100	DN 100 / 4"
DN125	DN 125 / 5"
DN150	DN 150 / 6"
DN200	DN 200 / 8"
DN250	DN 250 / 10"
DN300	DN 300 / 12"
DN350	DN 350 / 14"
DN400	DN 400 / 16"
DN450	DN 450 / 18"
DN500	DN 500 / 20"
DN600	DN 600 / 24"
DN700	DN 700 / 28"
DN800	DN 800 / 32"
DN900	DN 900 / 36"
DN1000	DN 1000 / 40"
DN1100	DN 1100 / 44"
DN1200	DN 1200 / 48"
DN1400	DN 1400 / 56"
DN1600	DN 1600 / 64"
DN1800	DN 1800 / 72"
DN2000	DN 2000 / 80"
Y9	others, please specify
3. Material sensor:	
S	1.4404 / 316L
V	1.4571 / 316Ti
Y	others, please specify
4. Process connection:	
00	without
FA	flanged connection
Y	others, please specify
4.1 Standard:	
E	EN 1092-1
A	ASME B 16.5
D	DIN (according to type & pressure rating)
Y	others, please specify
4.2 Nominal size:	
32	DN32
40	DN40
12	1-1/2"
Y9	others, please specify

Please see next page

IBFD-25/26 continuation	
Code	Description
4.3 Pressure class:	
C	PN16
D	PN40
E	PN63
F	PN100
G	PN160
H	PN250
I	PN320
J	PN400
K	150 lbs.
L	300 lbs.
M	600 lbs.
N	900 lbs.
O	1500 lbs.
P	2500 lbs.
Y9	others, please specify
4.4 Flange face process connetion flange:	
E0	EN 1092-1 Form A (without sealing strip; Ra 3.2-12.5µm)
E1	EN 1092-1 Form B1 (raised sealing strip; Ra 3,2-12,5µm)
E2	EN 1092-1 Form B2 (raised sealing strip; Ra 0,8-3,2µm)
E3	EN 1092-1 Form C (tongue; Ra 0,8-3,2µm)
E4	EN 1092-1 Form D (groove; Ra 0,8-3,2µm)
A1	ASME B 16.5 Raised Face (RF)
A2	ASME B 16.5 Raised Face Smooth Finish (RFSF)
A3	ASME B 16.5 Flat Face (FF)
A4	ASME B 16.5 Ring-Type Joint (RTJ)
A5	ASME B 16.5 Tongue (ASME)
A6	ASME B 16.5 Groove (ASME)
D1	DIN Form A (without special demand)
D2	DIN Form B (raised sealing strip ; Rz = 160µm)
D3	DIN Form C (raised sealing strip ; Rz = 160µm)
D4	DIN Form D (raised sealing strip ; Rz = 40µm)
D5	DIN Form E (raised sealing strip ; Rz = 16µm)
D6	DIN Form F (tongue acc. DIN 2512)
D7	DIN Form N (groove acc. DIN 2512)
Y9	others, please specify
4.5 Gasket:	
0	without
A	material: PTFE, thickness: 2 mm, max. 150°C (302°F)
B	Fibre-reinforced flat gasket; Klingersil C4400, thickness: 2 mm; max. 200°C (392°F)
C	Spiral wound gasket w/ IR(316)&AR(CS) filling graphite; thickn.: 4. mm; max. 450°C (842°F)
D	Sp.wnd gasket w/ IR(316SS)&AR(316SS) filling graphite; thickn.: 4.5mm; max.450°C (842°F)
RO	Ring-Joint Seal Type R-Oval ASME B16.20
Y9	others, please specify

Please see next page

Itabar-Flow-Sensors

IBFD-25/26 continuation	
Code	Description
4.6 Bolts / nuts:	
0	without
1	DIN931 (ISO 4014) hex-head screw with one nut; material: 5.6/5.2 (carbon steel zinc-plated)
2	DIN931 (ISO 4014) hex-head screw with one nut; material: A2-70 (stainless steel)
3	DIN 2510 Form L Material: 1.1181 / CK35
4	DIN 2510 Form L Material: 1.4301 / A2-70
5	ASME B16.5 Material: A193 Gr. B7 / A194 Gr. 2H (galvanised)
6	ASME B16.5 Material: A193 Gr. B8 Cl.1 / A194 Gr. 8
Y9	others, please specify
5. Design mounting part:	
0	without (provided by others / customer /)
R	mounting stud with flange (standard)
W0	weldolet assembly, stud with flange
Y9	others, please specify
5.1 Material mounting stud	
C	P250GH / A105
S	1.4404 / 316L
V	1.4571 / 316Ti
P	1.5415 / 16Mo3
E	1.7335 / 13CrMo44
F	1.7380 / 10CrMo910
Q	1.4903, X10CrMoVNb910
Y9	others, please specify
5.2 Standard:	
E	EN 1092-1
A	ASME B 16.5
D	DIN (according to type & pressure rating)
Y	others, please specify
5.3 Nominal size:	
32	DN32
40	DN40
12	1-1/2"
Y9	others, please specify
5.4 Pressure class:	
C	PN16
D	PN40
E	PN63
F	PN100
G	PN160
H	PN250
I	PN320
J	PN400
K	150 lbs.
L	300 lbs.
M	600 lbs.
N	900 lbs.
O	1500 lbs.
P	2500 lbs.
Y9	andere, bitte spezifizieren

Please see next page

IBFD-25/26 continuation	
Code	Description
5.5 Flange face mounting stud flange:	
E0	EN 1092-1 Form A (without sealing strip; Ra 3.2-12.5µm)
E1	EN 1092-1 Form B1 (raised sealing strip; Ra 3,2-12,5µm)
E2	EN 1092-1 Form B2 (raised sealing strip; Ra 0,8-3,2µm)
E3	EN 1092-1 Form C (tongue; Ra 0,8-3,2µm)
E4	EN 1092-1 Form D (groove; Ra 0,8-3,2µm)
A1	ASME B 16.5 Raised Face (RF)
A2	ASME B 16.5 Raised Face Smooth Finish (RFSF)
A3	ASME B 16.5 Flat Face (FF)
A4	ASME B 16.5 Ring-Type Joint (RTJ)
A5	ASME B 16.5 Tongue (ASME)
A6	ASME B 16.5 Groove (ASME)
D1	DIN Form A (without special demand)
D2	DIN Form B (raised sealing strip ; Rz = 160µm)
D3	DIN Form C (raised sealing strip ; Rz = 160µm)
D4	DIN Form D (raised sealing strip ; Rz = 40µm)
D5	DIN Form E (raised sealing strip ; Rz = 16µm)
D6	DIN Form F (tongue acc. DIN 2512)
D7	DIN Form N (groove acc. DIN 2512)
Y9	others, please specify
6. End support:	
0	without
C	material: C22.8 (similar A105)
S	material: 1.4404 / 316L
V	material: 1.4571 / 316Ti
P	material: 1.5415 / 16Mo3
E	material: 1.7335 / 13CrMo44
F	material: 1.7380 / 10CrMo910
Q	material: 1.4903, X10CrMoVNb910
Y	others, please specify
7. Pipe insulation:	
KI	without
X	insulation in mm (min. 50mm)
Y	others, please specify
8. Pipe run/flow direction:	
HL	horizontal, left
HR	horizontal, right
VD	vertical, down
VU	vertical, upwards
Y9	others, please specify

Please see next page

Itabar-Flow-Sensors

IBFD-25/26 continuation	
Code	Description
9. Integrated temperature sensor:	
T0	without
TA	3-wire, RTD -50 bis 400°C, without Ex approval, Sensor diameter=Ø0.5mm
TB	3-wire, RTD -50 bis 400°C, Ex approval, Sensor diameter=Ø0.5mm
TC	thermocouple type K with INT5334-A3B non-ex-version; 4...20 mA output
TX	sensor prepared for PT100, probe diameter = Ø0.5mm (customer provision)
Y	others, please specify
9.1 Head transmitter for integrated temperature sensor:	
0	without
2	4...20 mA / without Ex approval
3	4...20 mA + HART / without Ex approval
4	Profibus PA / without Ex approval
5	Foundation Fieldbus / without Ex approval
6	4...20 mA /ATEX Ex ia
7	4...20 mA + HART / ATEX Ex ia
8	Profibus PA / ATEX Ex ia
9	Foundation Fieldbus / ATEX Ex ia
Y	others, please specify
10. Condensate vessels:	
A00	without
K1H	flanged cond. pots; Ø88,9x5mm; mat.: P265GH; PN100 (600#) (remote version)
W1H	welded cond. pots; Ø88,9x5mm; mat.: P265GH; PN100 (600#) (remote version)
K1S	flanged cond. pots; Ø88,9x5mm; mat.: 316Ti (1.4571); 600# (PN100) (remote version)
F1S	welded cond. pots; Ø88,9x5mm; mat.: 316Ti (1.4571); 600# (PN100) (remote version)
A1H	welded cond. pots; Ø88,9x5mm; mat.: heavy poiler plate (HII); 600# (PN100) (comp. version)
A1S	welded cond. pots; Ø88,9x5mm; mat.: 316Ti (1.4571); 600# (PN100) (comp. version)
K1P	welded cond. pots; Ø90x17,5mm; Mat.: 1.5415 (16Mo3); High-pressure design
Y99	others, please specify
11. Differential pressure connection:	
A03	1 pair of nozzles, MNPT1/2" (remote version)
AS2	1 pair welding connection Ø21.3x3,2mm - welding end (remote version)
AS3	1 pair welding connection Ø21.3x6,3mm - welding end (remote version)
AS4	1 pair welding connection Ø24x4,0mm - welding end (remote version)
A06	IEC 61518; PTFE gasket
A16	IEC 61518; Viton gasket
Y99	others, please specify
12. Shut-off valve for remote version (initial shut-off):	
A00	without
A62	1 pair valve, PN400, housing: SS316/316L, female 1/2" NPT, packing: Graphite
A81	1 pair gate valve 800lbs. housing: A105, female 1/2" NPT, packing: Graphite
A82	1 pair gate valve 800lbs. housing: 316SS, female 1/2" NPT, packing: Graphite
AV1	1 pair valve, PN400, housing: C22.8 (A105), Ø21,3x6,3/Ø14,0x2,5 , packing: Graphite
AV2	1 pair valve, PN400, housing: 1.4571 (316Ti), Ø21,3x6,3/Ø14,0x2,5 , packing: Graphite
AV3	valve, PN400, housing: 1.5415 (16Mo3), Ø21,3x6,3/Ø14,0x2,5 , packing: Graphite
Y99	others, please specify

Please see next page

IBFD-25/26 continuation	
Code	Description
12.1 First Shut-off accessories:	
0	without
E12	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø12mm, mat.: 316SS
E14	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø14mm, mat.: 316SS
Y99	others, please specify
12.2 Manifold for remote version:	
0	without
A65P	3-way-manifold, 316/316L, PN420 DN5, In/Out: 1/2"-NPTF/IEC61518-A, pckg: PTFE
A70P	5-way-manifold, 316/316L PN420 DN5, In/Out: 1/2"-NPTF/IEC61518-A, pckg: PTFE
Y99	others, please specify
12.2.1 Mounting set for remote version (manifold):	
0	without
MBC	mounting set, CS zinc-plated, for 2" pipe mounting, incl. screws 7/16-UNF/ FPM90-O-Ring
MBS	mounting set, stainless steel, for 2" pipe mounting, incl. screws 7/16-UNF/ FPM90-O-Ring
Y99	others, please specify
12.2.2 Accessories for manifold:	
0	without
E12	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø12mm, mat.: 316SS
E14	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø14mm, mat.: 316SS
Y99	others, please specify
13. Valve block for compact version:	
A000	without
A66M	3-way-manifold, IEC 61518, material: 1.4404 (316L), packing: PTFE, screws M10
A66U	3-way-manifold, IEC 61518, material: 1.4404 (316L), packing: PTFE, screws 7/16-UNF
A71M	5-way-manifold, IEC 61518, material: 1.4404 (316L), packing: PTFE, screws M10
A71U	5-way-manifold, IEC 61518, material: 1.4404 (316L), packing: PTFE, screws 7/16-UNF
Y999	others, please specify
14. Special design/pre-assembly:	
0	without
M01	mounting of dp transmitter (customer provision)
M03	mounting of p transmitter (customer provision) with oval flange, mat. st.st.
A4	cleaned from oil+grease certificate
A5	oxygen service certificate
A6	PWIS free certificate (PWIS = paint-wetting impairment substances)
Y99	others, please specify

Itabar-Flow-Sensors

d3) IBFD-35/36

ITABAR®-FLOW-SENSOR for Steam, flanged connection.	
Code	Description
1. Type:	
IBFD-35	Sensor Ø42mm prepared for flanged process connection; for steam without end support
IBFD-36	Sensor Ø42mm prepared for flanged process connection; for steam with end support
2. Pipe (duct) size: (ID/WT):	
DN100	DN 100 / 4"
DN125	DN 125 / 5"
DN150	DN 150 / 6"
DN200	DN 200 / 8"
DN250	DN 250 / 10"
DN300	DN 300 / 12"
DN350	DN 350 / 14"
DN400	DN 400 / 16"
DN450	DN 450 / 18"
DN500	DN 500 / 20"
DN600	DN 600 / 24"
DN700	DN 700 / 28"
DN800	DN 800 / 32"
DN900	DN 900 / 36"
DN1000	DN 1000 / 40"
DN1100	DN 1100 / 44"
DN1200	DN 1200 / 48"
DN1400	DN 1400 / 56"
DN1600	DN 1600 / 64"
DN1800	DN 1800 / 72"
DN2000	DN 2000 / 80"
Y9	others, please specify
3. Material sensor:	
S	1.4404 / 316L
V	1.4571 / 316Ti
Y	others, please specify
4. Process connection:	
00	without
FA	flanged connection
Y	others, please specify
4.1 Standard:	
E	EN 1092-1
A	ASME B 16.5
D	DIN (according to type & pressure rating)
Y	others, please specify
4.2 Nominal size:	
50	DN50
20	2"
Y9	others, please specify

Please see next page

IBFD-35/36 continuation	
Code	Description
4.3 Pressure class:	
C	PN16
D	PN40
E	PN63
F	PN100
G	PN160
H	PN250
I	PN320
J	PN400
K	150 lbs.
L	300 lbs.
M	600 lbs.
N	900 lbs.
O	1500 lbs.
P	2500 lbs.
Y9	others, please specify
4.4 Flange face process connection flange:	
E0	EN 1092-1 Form A (without sealing strip; Ra 3.2-12.5µm)
E1	EN 1092-1 Form B1 (raised sealing strip; Ra 3,2-12,5µm)
E2	EN 1092-1 Form B2 (raised sealing strip; Ra 0,8-3,2µm)
E3	EN 1092-1 Form C (tongue; Ra 0,8-3,2µm)
E4	EN 1092-1 Form D (groove; Ra 0,8-3,2µm)
A1	ASME B 16.5 Raised Face (RF)
A2	ASME B 16.5 Raised Face Smooth Finish (RFSF)
A3	ASME B 16.5 Flat Face (FF)
A4	ASME B 16.5 Ring-Type Joint (RTJ)
A5	ASME B 16.5 Tongue (ASME)
A6	ASME B 16.5 Groove (ASME)
D1	DIN Form A (without special demand)
D2	DIN Form B (raised sealing strip ; Rz = 160µm)
D3	DIN Form C (raised sealing strip ; Rz = 160µm)
D4	DIN Form D (raised sealing strip ; Rz = 40µm)
D5	DIN Form E (raised sealing strip ; Rz = 16µm)
D6	DIN Form F (tongue acc. DIN 2512)
D7	DIN Form N (groove acc. DIN 2512)
Y9	others, please specify
4.5 Gasket:	
0	without
A	material: PTFE, thickness: 2 mm, max. 150°C (302°F)
B	Fibre-reinforced flat gasket; Klingersil C4400, thickness: 2 mm; max. 200°C (392°F)
C	Spiral wound gasket w/ IR(316)&AR(CS) filling graphite; thickn.: 4. mm; max. 450°C (842°F)
D	Sp.wnd gasket w/ IR(316SS)&AR(316SS) filling graphite; thickn.: 4.5mm; max.450°C (842°F)
RO	Ring-Joint Seal Type R-Oval ASME B16.20
Y9	others, please specify

Please see next page

Itabar-Flow-Sensors

IBFD-35/36 continuation	
Code	Description
4.6 Bolts / nuts:	
0	without
1	DIN931 (ISO 4014) hex-head screw with one nut; material: 5.6/5.2 (carbon steel zinc-plated)
2	DIN931 (ISO 4014) hex-head screw with one nut; material: A2-70 (stainless steel)
3	DIN 2510 Form L Material: 1.1181 / CK35
4	DIN 2510 Form L Material: 1.4301 / A2-70
5	ASME B16.5 Material: A193 Gr. B7 / A194 Gr. 2H (galvanized)
6	ASME B16.5 Material: A193 Gr. B8 Cl.1 / A194 Gr. 8
Y9	others, please specify
5. Design mounting part:	
0	without (provided by others / customer /)
R	mounting stud with flange (standard)
W0	weldolet assembly, stud with flange
Y9	others, please specify
5.1 Material mounting stud	
C	P250GH / A105
S	1.4404 / 316L
V	1.4571 / 316Ti
P	1.5415 / 16Mo3
E	1.7335 / 13CrMo44
F	1.7380 / 10CrMo910
Q	1.4903, X10CrMoVNB910
Y9	others, please specify
5.2 Standard:	
E	EN 1092-1
A	ASME B 16.5
D	DIN (according to type & pressure rating)
Y	others, please specify
5.3 Nominal size:	
50	DN50
20	2"
Y9	others, please specify
5.4 Pressure class:	
C	PN16
D	PN40
E	PN63
F	PN100
G	PN160
H	PN250
I	PN320
J	PN400
K	150 lbs.
L	300 lbs.
M	600 lbs.
N	900 lbs.
O	1500 lbs.
P	2500 lbs.
Y9	andere, bitte spezifizieren

Please see next page

IBFD-35/36 continuation	
Code	Description
5.5 Flange face mounting stud flange:	
E0	EN 1092-1 Form A (without sealing strip; Ra 3.2-12.5µm)
E1	EN 1092-1 Form B1 (raised sealing strip; Ra 3,2-12,5µm)
E2	EN 1092-1 Form B2 (raised sealing strip; Ra 0,8-3,2µm)
E3	EN 1092-1 Form C (tongue; Ra 0,8-3,2µm)
E4	EN 1092-1 Form D (groove; Ra 0,8-3,2µm)
A1	ASME B 16.5 Raised Face (RF)
A2	ASME B 16.5 Raised Face Smooth Finish (RFSF)
A3	ASME B 16.5 Flat Face (FF)
A4	ASME B 16.5 Ring-Type Joint (RTJ)
A5	ASME B 16.5 Tongue (ASME)
A6	ASME B 16.5 Groove (ASME)
D1	DIN Form A (without special demand)
D2	DIN Form B (raised sealing strip ; Rz = 160µm)
D3	DIN Form C (raised sealing strip ; Rz = 160µm)
D4	DIN Form D (raised sealing strip ; Rz = 40µm)
D5	DIN Form E (raised sealing strip ; Rz = 16µm)
D6	DIN Form F (tongue acc. DIN 2512)
D7	DIN Form N (groove acc. DIN 2512)
Y9	others, please specify
6. End support:	
0	without
C	material: C22.8 (similar A105)
S	material: 1.4404 / 316L
V	material: 1.4571 / 316Ti
P	material: 1.5415 / 16Mo3
E	material: 1.7335 / 13CrMo44
F	material: 1.7380 / 10CrMo910
Q	material: 1.4903, X10CrMoVNb910
Y	others, please specify
7. Pipe insulation:	
KI	without
X	insulation in mm (min. 50mm)
Y	others, please specify
8. Pipe run/flow direction:	
HL	horizontal, left
HR	horizontal, right
VD	vertical, down
VU	vertical, upwards
Y9	others, please specify

Please see next page

Itabar-Flow-Sensors

IBFD-35/36 continuation	
Code	Description
9. Integrated temperature sensor:	
T0	without
TA	3-wire, RTD -50 bis 400°C, without Ex approval, Sensor diameter=Ø0.5mm
TB	3-wire, RTD -50 bis 400°C, Ex approval, Sensor diameter=Ø0.5mm
TC	thermocouple type K with INT5334-A3B non-ex-version; 4...20 mA output
TX	sensor prepared for PT100, probe diameter = Ø0.5mm (customer provision)
Y	others, please specify
9.1 Head transmitter for integrated temperature sensor:	
0	without
2	4...20 mA / without Ex approval
3	4...20 mA + HART / without Ex approval
4	Profibus PA / without Ex approval
5	Foundation Fieldbus / without Ex approval
6	4...20 mA /ATEX Ex ia
7	4...20 mA + HART / ATEX Ex ia
8	Profibus PA / ATEX Ex ia
9	Foundation Fieldbus / ATEX Ex ia
Y	others, please specify
10. Condensate vessels:	
A00	without
K1H	flanged cond. pots; Ø88,9x5mm; mat.: P265GH; PN100 (600#) (remote version)
W1H	welded cond. pots; Ø88,9x5mm; mat.: P265GH; PN100 (600#) (remote version)
K1S	flanged cond. pots; Ø88,9x5mm; mat.: 316Ti (1.4571); 600# (PN100) (remote version)
F1S	welded cond. pots; Ø88,9x5mm; mat.: 316Ti (1.4571); 600# (PN100) (remote version)
A1H	welded cond. pots; Ø88,9x5mm; mat.: heavy poiler plate (HII); 600# (PN100) (comp. version)
A1S	welded cond. pots; Ø88,9x5mm; mat.: 316Ti (1.4571); 600# (PN100) (comp. version)
K1P	welded cond. pots; Ø90x17,5mm; Mat.: 1.5415 (16Mo3); High-pressure design
Y99	others, please specify
11. Differential pressure connection:	
A03	1 pair of nozzles, MNPT1/2" (remote version)
AS2	1 pair welding connection Ø21.3x3,2mm - welding end (remote version)
AS3	1 pair welding connection Ø21.3x6,3mm - welding end (remote version)
AS4	1 pair welding connection Ø24x4,0mm - welding end (remote version)
A06	IEC 61518; PTFE gasket
A16	IEC 61518; Viton gasket
Y99	others, please specify
12. Shut-off valve for remote version (initial shut-off):	
A00	without
A62	1 pair valve, PN400, housing: SS316/316L, female 1/2" NPT, packing: Graphite
A81	1 pair gate valve 800lbs. housing: A105, female 1/2" NPT, packing: Graphite
A82	1 pair gate valve 800lbs. housing: 316SS, female 1/2" NPT, packing: Graphite
AV1	1 pair valve, PN400, housing: C22.8 (A105), Ø21,3x6,3/Ø14,0x2,5 , packing: Graphite
AV2	1 pair valve, PN400, housing: 1.4571 (316Ti), Ø21,3x6,3/Ø14,0x2,5 , packing: Graphite
AV3	valve, PN400, housing: 1.5415 (16Mo3), Ø21,3x6,3/Ø14,0x2,5 , packing: Graphite
Y99	others, please specify

Please see next page

IBFD-35/36 continuation	
Code	Description
12.1 First Shut-off accessories:	
0	without
E12	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø12mm, mat.: 316SS
E14	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø14mm, mat.: 316SS
Y99	others, please specify
12.2 Manifold for remote version:	
0	without
A65P	3-way-manifold, 316/316L, PN420 DN5, In/Out: 1/2"-NPTF/IEC61518-A, pckg: PTFE
A70P	5-way-manifold, 316/316L PN420 DN5, In/Out: 1/2"-NPTF/IEC61518-A, pckg: PTFE
Y99	others, please specify
12.2.1 Mounting set for remote version (manifold):	
0	without
MBC	mounting set, CS zinc-plated, for 2" pipe mounting, incl. screws 7/16-UNF/ FPM90-O-Ring
MBS	mounting set, stainless steel, for 2" pipe mounting, incl. screws 7/16-UNF/ FPM90-O-Ring
Y99	others, please specify
12.2.2 Accessories for manifold:	
0	without
E12	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø12mm, mat.: 316SS
E14	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø14mm, mat.: 316SS
Y99	others, please specify
13. Valve block for compact version:	
A000	without
A66M	3-way-manifold, IEC 61518, material: 1.4404 (316L), packing: PTFE, screws M10
A66U	3-way-manifold, IEC 61518, material: 1.4404 (316L), packing: PTFE, screws 7/16-UNF
A71M	5-way-manifold, IEC 61518, material: 1.4404 (316L), packing: PTFE, screws M10
A71U	5-way-manifold, IEC 61518, material: 1.4404 (316L), packing: PTFE, screws 7/16-UNF
Y999	others, please specify
14. Special design/pre-assembly:	
0	without
M01	mounting of dp transmitter (customer provision)
M03	mounting of p transmitter (customer provision) with oval flange, mat. st.st.
A4	cleaned from oil+grease certificate
A5	oxygen service certificate
A6	PWIS free certificate (PWIS = paint-wetting impairment substances)
Y99	others, please specify

Itabar-Flow-Sensors

IBFD-26/36-HT

C.2.3 Itabar for Superheated Steam (flanged version)

Types: IBFD-26/36-HT (up to 5802 psi [400 bar] and 1202°F [650°C])

a.) Description

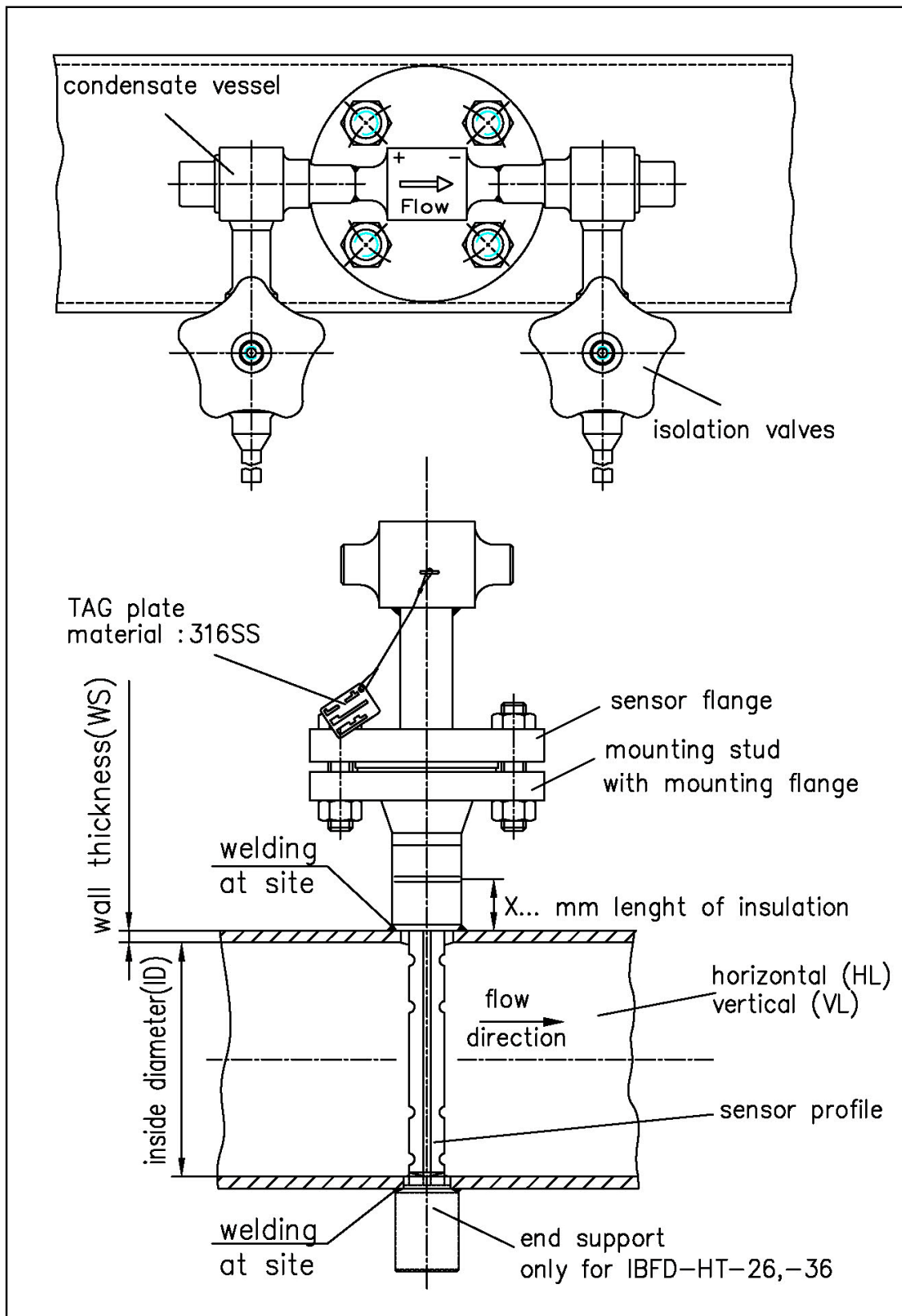
With its strengthened sensor head and assembly parts sensor type IBFD-HT is especially designed for use in superheated steam applications with high operating pressures and temperatures.

Materials	Max. Steam Temperature
1.5415 (15 Mo 3)	986 °F / 530 °C
1.7335 (10 CrMo 4 4)	1040 °F / 560 °C
1.7380 (10 CrMo 9 10)	1094°F / 590 °C
1.4903 (10 CrMoVNB 91)	1202°F / 650 °C



Fig 58: IBFD-HT

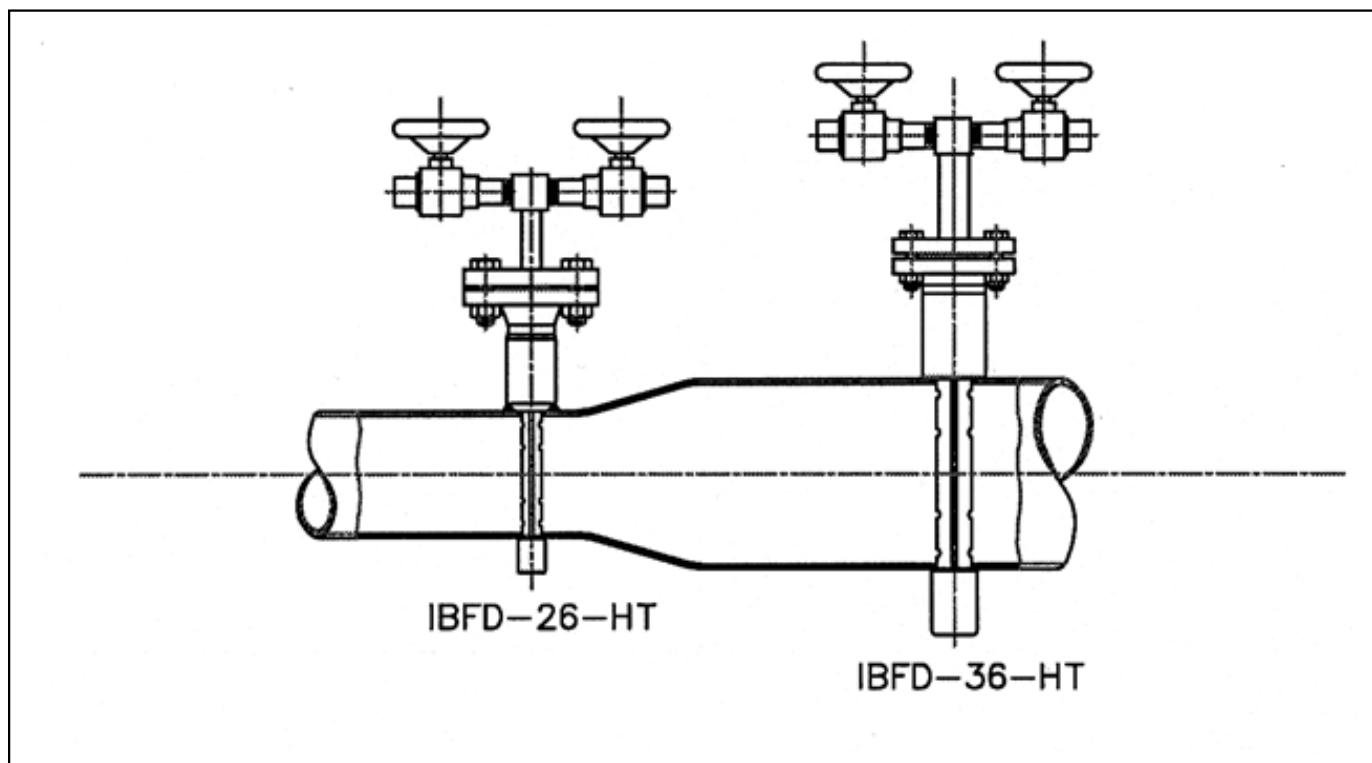
b) Drawing for IBFD-HT



Itabar-Flow-Sensors

c.) Order Data for Itabar® Series IBFD-26/36-HT

c.1) Sensor type:



Pipe ID DN	Pipe ID Inches	Max. allowable volume flow m ³ /h	
		IBFD -26-HT	IBFD -36-HT
100	4	1103	---
125	5	1456	---
150	6	1810	---
200	8	2516	---
250	10	3286	---
300	12	4119	4501
350	14	4925	5399
400	16	5706	6300
500	20	7341	8018
600	24	8948	9716

These values are for water of $\rho = 0,9982 \text{ kg/l}$ SGU and at a temperature $T = 20 \text{ }^{\circ}\text{C}$. To calculate volumetric or mass flow of fluids with other densities see chapter 6 „Specifications of DP Sensors with WINFLOW“.

Selection and Specification of a Steam- flow-Sensor P-max. 5880 PSI (400 bar), P-T-max. 1202 °F

Order Example for ITABAR Flow Sensor, HT-Version

Existing Process Data

Pipe size	12"
Medium	Steam
Pressure	3822 PSI (260 bar)
Temperature	1184°F (640°C)
Material of existing pipe	10 CrMo 910

1. Determine the material of the pipe (to determine welding compatibility), in this example 10 CrMo 910.
2. From table , page 151, determine pressure specs of assembly welding boss.
3. From table, 135 determine compatible material – 10 CrMoVNb 91
4. With Winflow program determine the right sensor type (considering flow velocity). In this case the recommended sensor is IBFD-26-HT.
5. Selection of condensate pots and shut-off valves, see table page 153/154. If a combination condensate pots / shut-off valves is required see table 155. For the case of this example the table does not offer a combination. Thus condensate pots and shut-off valves must be ordered separately.
6. Isolation of pipe – in this example 200 mm
7. Pipe configuration – in this example vertical

Order code example

IBFD-26-HT-ID300/14mm-C-SM-1-D8-W-M-S37-C-K8-A22-A22-X200-VL

INTRA-AUTOMATION GmbH

D-41515 Grevenbroich * Otto-Hahn-Str. 20 * Tel: +49 2181-68761 * Fax: +49 2181-64492

WINFLOW 2.75 (I) Diff. Pressure Calculation ITABAR - Flow - Sensor

Company: Mustermann
Name(capital letters):
Street:
Zip Code/City:
Offer-/Com. No:
P. Order Number:
Tag No.:
Serial No.:
Pipe Data: ID= 300,000/15,000 mm - horizontal
Date: 18.04.2002
Person in charge U.P.

Calculation: Mass rate Gas & steam
Fluid: Superheated steam

Pipe Internal Dimensions: 300,000 mm
Flowing Temperature: 640,000 °C
Flowing Pressure: 260,000 bar A
Density: 68,669 kg/m³
Viscosity: 0,0359 cPs
K-Factor: 0,6274 without unit

Base Temperature	273,15 Kelvin
Base Pressure	101,30 kPa

	QMax	QNorm	QMin	
Flow Rate	50.000,00	40.000,00	10.000,00	kg/H
Reynolds No.	1.637.037	1.309.630	327.407	without unit
Permanent press. loss	6,290	4,020	0,250	mbar
Expansionsfactor	1,000	1,000	1,000	without unit
Velocity:	2,86	2,29	0,57	m/sec.
Differential Pressure	6,913	4,424	0,277	mbar

Itabar-Type: IBFD-26 HT-C-SM-1-D6-W-M-S37-C-K8-A22-A22-X200-VL
Material Sensor: A335 GRADE P11 (10CrMoVNb 91)
Note:

Max. DeltaP	1.905,20 mbar	Max. Flow Rate	830.064,63 kg/H
Natural Freq.:	121,16		

d) Order Specifications Itabar-Flow-Sensors, Series IBFD-*-HT

d1) IBFD-26-HT

ITABAR®-FLOW-SENSOR for Superheated Steam, flanged version	
Code	Description
1. Type:	
IBFD-26-HT	Sensor Ø25,4mm prepared for flanged process connection; for superheated steam with end support
2. Pipe (duct) size: (ID/WT):	
DN100	DN 100 / 4"
DN125	DN 125 / 5"
DN150	DN 150 / 6"
DN200	DN 200 / 8"
DN250	DN 250 / 10"
DN300	DN 300 / 12"
DN350	DN 350 / 14"
DN400	DN 400 / 16"
DN450	DN 450 / 18"
DN500	DN 500 / 20"
DN600	DN 600 / 24"
Y9	others, please specify
3. Material sensor / process connection:	
P	1.5415 / 16Mo3
E	1.7335 / 13CrMo44
F	1.7380 / 10CrMo910
Q	1.4903 / X10CrMoVNb910
Y	others, please specify
4. Process connection:	
00	without
FA	flanged connection
Y	others, please specify
4.1 Standard:	
E	EN 1092-1
A	ASME B 16.5
D	DIN (according to type & pressure rating)
Y	others, please specify
4.2 Nominal size:	
32	DN32
40	DN40
12	1-1/2"
Y9	others, please specify

Please see next page

Itabar-Flow-Sensors

IBFD-26-HT continuation	
Code	Description
4.3 Pressure class:	
C	PN16
D	PN40
E	PN63
F	PN100
G	PN160
H	PN250
I	PN320
J	PN400
K	150 lbs.
L	300 lbs.
M	600 lbs.
N	900 lbs.
O	1500 lbs.
P	2500 lbs.
Y9	others, please specify
4.4 Flange face process connection flange:	
E0	EN 1092-1 Form A (without sealing strip; Ra 3.2-12.5µm)
E1	EN 1092-1 Form B1 (raised sealing strip; Ra 3,2-12,5µm)
E2	EN 1092-1 Form B2 (raised sealing strip; Ra 0,8-3,2µm)
E3	EN 1092-1 Form C (tongue; Ra 0,8-3,2µm)
E4	EN 1092-1 Form D (groove; Ra 0,8-3,2µm)
A1	ASME B 16.5 Raised Face (RF)
A2	ASME B 16.5 Raised Face Smooth Finish (RFSF)
A3	ASME B 16.5 Flat Face (FF)
A4	ASME B 16.5 Ring-Type Joint (RTJ)
A5	ASME B 16.5 Tongue (ASME)
A6	ASME B 16.5 Groove (ASME)
D1	DIN Form A (without special demand)
D2	DIN Form B (raised sealing strip ; Rz = 160µm)
D3	DIN Form C (raised sealing strip ; Rz = 160µm)
D4	DIN Form D (raised sealing strip ; Rz = 40µm)
D5	DIN Form E (raised sealing strip ; Rz = 16µm)
D6	DIN Form F (tongue acc. DIN 2512)
D7	DIN Form N (groove acc. DIN 2512)
Y9	others, please specify
4.5 Gasket:	
0	without
C	Sp. wd gasket w/ IR(316) & AR(CS) filling graphite; thickn.: 4.5 mm; max. 450°C (842°F)
D	Sp. wd gasket w/ IR(1.4541)&AR(316SS) flg graphite; thickn.: 4.5 mm; max. 450°C (842°F)
X	Sp. wd gasket w/ IR(1.4541) & AR(1.4541) filling Graphite APX (for higher temperature).
RO	Ring-Joint Seal Type R-Oval ASME B16.20
Y9	others, please specify

see next page

IBFD-26-HT continuation	
Code	Description
4.6 Bolts / nuts:	
0	without
G	DIN 2510 Form L Material: 1.7709 / GA
V	DIN 2510 Form L Material: 1.4923 / V
5	ASME B16.5 Material: A193 Gr. B7 / A194 Gr. 2H (galvanised)
6	ASME B16.5 Material: A193 Gr. B8 Cl.1 / A194 Gr. 8
Y9	others, please specify
5. Design mounting part:	
0	without (provided by others / customer /)
R	mounting stud with flange (standard)
W0	weldolet assembly, stud with flange
Y9	others, please specify
5.1 Material mounting stud:	
P	1.5415 / 16Mo3
E	1.7335 / 13CrMo44
F	1.7380 / 10CrMo910
Q	1.4903, X10CrMoVNB910
Y9	others, please specify
5.2 Standard:	
E	EN 1092-1
A	ASME B 16.5
D	DIN (according to type & pressure rating)
Y	others, please specify
5.3 Nominal size:	
32	DN32
40	DN40
12	1-1/2"
Y9	others, please specify
5.4 Pressure class:	
C	PN16
D	PN40
E	PN63
F	PN100
G	PN160
H	PN250
I	PN320
J	PN400
K	150 lbs.
L	300 lbs.
M	600 lbs.
N	900 lbs.
O	1500 lbs.
P	2500 lbs.
Y9	andere, bitte spezifizieren

Please see next page

Itabar-Flow-Sensors

IBFD-26-HT continuation	
Code	Description
5.5 Flange face mounting stud flange:	
E0	EN 1092-1 Form A (without sealing strip; Ra 3.2-12.5µm)
E1	EN 1092-1 Form B1 (raised sealing strip; Ra 3,2-12,5µm)
E2	EN 1092-1 Form B2 (raised sealing strip; Ra 0,8-3,2µm)
E3	EN 1092-1 Form C (tongue; Ra 0,8-3,2µm)
E4	EN 1092-1 Form D (groove; Ra 0,8-3,2µm)
A1	ASME B 16.5 Raised Face (RF)
A2	ASME B 16.5 Raised Face Smooth Finish (RFSF)
A3	ASME B 16.5 Flat Face (FF)
A4	ASME B 16.5 Ring-Type Joint (RTJ)
A5	ASME B 16.5 Tongue (ASME)
A6	ASME B 16.5 Groove (ASME)
D1	DIN Form A (without special demand)
D2	DIN Form B (raised sealing strip ; Rz = 160µm)
D3	DIN Form C (raised sealing strip ; Rz = 160µm)
D4	DIN Form D (raised sealing strip ; Rz = 40µm)
D5	DIN Form E (raised sealing strip ; Rz = 16µm)
D6	DIN Form F (tongue acc. DIN 2512)
D7	DIN Form N (groove acc. DIN 2512)
Y9	others, please specify
6. End support:	
0	without
P	material: 1.5415 / 16Mo3
E	material: 1.7335 / 13CrMo44
F	material: 1.7380 / 10CrMo910
Q	material: 1.4903, X10CrMoVNb910
Y	others, please specify
7. Pipe insulation:	
KI	without
X	insulation in mm (min. 50mm)
Y	others, please specify
8. Pipe run/flow direction:	
HL	horizontal, left
HR	horizontal, right
VD	vertical, down
VU	vertical, upwards
Y9	others, please specify
9. Condensate vessels:	
K0	without
K5	welded condensate pots; Ø90x17,5mm; Material: 16Mo3 (1.5415; A355 Gr. P1)
K6	welded condensate pots; Ø90x17,5mm; Material: 13CrMo44 (1.7335; A355 Gr. P11)
K7	welded condensate pots; Ø90x17,5mm; Material: 10CrMo910 (1.7380; A335 Gr. P22)
K8	welded condensate pots; Ø90x17,5mm; Material: X10CrMoVNb91 (1.4903; A335 Gr. P91)
Y99	others, please specify

Please see next page

IBFD-26-HT continuation	
Code	Description
10. Differential pressure connection:	
AS2	1 pair welding connection Ø21.3x3,2mm - welding end (remote version)
AS3	1 pair welding connection Ø21.3x6,3mm - welding end (remote version)
AS4	1 pair welding connection Ø24x4,0mm - welding end (remote version)
Y99	others, please specify
11. Shut-off valve (initial shut-off):	
A00	without
A13	1 pair valve, PN400, hsg: 1.5415/16Mo3, Ø21,3x3,2mm/Ø21,3x3,2mm; pckg: Graph.
A14	1 pair valve, PN400, hsg: 1.7335/13CrMo44, Ø21,3x3,2mm/Ø21,3x3,2mm; pckg: Graph.
A15	1 pair valve, PN400, hsg: 1.7380/10CrMo910, Ø21,3x3,2mm/Ø21,3x3,2mm; pckg: Graph.
A16	1 p. valve, PN400, hsg: 1.4903/X10CrMoVNb910, Ø21,3x3,2mm/Ø21,3x3,2mm; pckg: Graph.
A23	1 pair valve, PN400, hsg: 1.5415/16Mo3, Ø21,3x6,3mm/Ø21,3x6,3mm; pckg: Graph.
A24	1 pair valve, PN400, hsg: 1.7335/13CrMo44, Ø21,3x6,3mm/Ø21,3x6,3mm; pckg: Graph.
A25	1 pair valve, PN400, hsg: 1.7380/10CrMo910, Ø21,3x6,3mm/Ø21,3x6,3mm; pckg: Graph.
A26	1 p. valve, PN400, hsg: 1.4903/X10CrMoVNb910, Ø21,3x6,3mm/Ø21,3x6,3mm; pckg: Graph.
A33	1 pair valve, PN400, hsg: 1.5415/16Mo3, Ø21,3x3,2mm/Ø14x2,5mm; pckg: Graph.
A34	1 pair valve, PN400, hsg: 1.7335/13CrMo44, Ø21,3x3,2mm/Ø14x2,5mm; pckg: Graph.
A35	1 pair valve, PN400, hsg: 1.7380/10CrMo910, Ø21,3x3,2mm/Ø14x2,5mm; pckg: Graph.
A36	1 pair valve, PN400, hsg: 1.4903/X10CrMoVNb910, Ø21,3x3,2mm/Ø14x2,5mm; pckg: Graph.
A43	1 pair valve, PN400, hsg: 1.5415/16Mo3, Ø21,3x6,3mm/Ø14x2,5mm; pckg: Graph.
A44	1 pair valve, PN400, hsg: 1.7335/13CrMo44, Ø21,3x6,3mm/Ø14x2,5mm; pckg: Graph.
A45	1 pair valve, PN400, hsg: 1.7380/10CrMo910, Ø21,3x6,3mm/Ø14x2,5mm; pckg: Graph.
A46	1 pair valve, PN400, hsg: 1.4903/X10CrMoVNb910, Ø21,3x6,3mm/Ø14x2,5mm; pckg: Graph.
Y99	others, please specify
12. Shut-off valve (secondary shut-off):	
A00	without
A13	1 pair valve, PN400, hsg: 1.5415/16Mo3, Ø21,3x3,2mm/Ø21,3x3,2mm; pckg: Graph.
A14	1 pair valve, PN400, hsg: 1.7335/13CrMo44, Ø21,3x3,2mm/Ø21,3x3,2mm; pckg: Graph.
A15	1 pair valve, PN400, hsg: 1.7380/10CrMo910, Ø21,3x3,2mm/Ø21,3x3,2mm; pckg: Graph.
A16	1 p. valve, PN400, hsg: 1.4903/X10CrMoVNb910, Ø21,3x3,2mm/Ø21,3x3,2mm; pckg: Graph.
A23	1 pair valve, PN400, hsg: 1.5415/16Mo3, Ø21,3x6,3mm/Ø21,3x6,3mm; pckg: Graph.
A24	1 pair valve, PN400, hsg: 1.7335/13CrMo44, Ø21,3x6,3mm/Ø21,3x6,3mm; pckg: Graph.
A25	1 pair valve, PN400, hsg: 1.7380/10CrMo910, Ø21,3x6,3mm/Ø21,3x6,3mm; pckg: Graph.
A26	1 p. valve, PN400, hsg: 1.4903/X10CrMoVNb910, Ø21,3x6,3mm/Ø21,3x6,3mm; pckg: Graph.
A33	1 pair valve, PN400, hsg: 1.5415/16Mo3, Ø21,3x3,2mm/Ø14x2,5mm; pckg: Graph.
A34	1 pair valve, PN400, hsg: 1.7335/13CrMo44, Ø21,3x3,2mm/Ø14x2,5mm; pckg: Graph.
A35	1 pair valve, PN400, hsg: 1.7380/10CrMo910, Ø21,3x3,2mm/Ø14x2,5mm; pckg: Graph.
A36	1 pair valve, PN400, hsg: 1.4903/X10CrMoVNb910, Ø21,3x3,2mm/Ø14x2,5mm; pckg: Graph.
A43	1 pair valve, PN400, hsg: 1.5415/16Mo3, Ø21,3x6,3mm/Ø14x2,5mm; pckg: Graph.
A44	1 pair valve, PN400, hsg: 1.7335/13CrMo44, Ø21,3x6,3mm/Ø14x2,5mm; pckg: Graph.
A45	1 pair valve, PN400, hsg: 1.7380/10CrMo910, Ø21,3x6,3mm/Ø14x2,5mm; pckg: Graph.
A46	1 pair valve, PN400, hsg: 1.4903/X10CrMoVNb910, Ø21,3x6,3mm/Ø14x2,5mm; pckg: Graph.
Y99	others, please specify
13. Special design:	
0	without
Y	others, please specify

Itabar-Flow-Sensors

d1) IBFD-36-HT

ITABAR®-FLOW-SENSOR for Superheated Steam, flanged version	
Code	Description
1. Type:	
IBFD-36-HT	Sensor Ø42mm prepared for flanged process connection; for superheated steam with end support
2. Pipe (duct) size: (ID/WT):	
DN300	DN 300 / 12"
DN350	DN 350 / 14"
DN400	DN 400 / 16"
DN450	DN 450 / 18"
DN500	DN 500 / 20"
DN600	DN 600 / 24"
Y9	others, please specify
3. Material sensor / process connection:	
P	1.5415 / 16Mo3
E	1.7335 / 13CrMo44
F	1.7380 / 10CrMo910
Q	1.4903 / X10CrMoVNb910
Y	others, please specify
4. Process connection:	
00	without
FA	flanged connection
Y	others, please specify
4.1 Standard:	
E	EN 1092-1
A	ASME B 16.5
D	DIN (according to type & pressure rating)
Y	others, please specify
4.2 Nominal size:	
50	DN50
20	2"
Y9	others, please specify
4.3 Pressure class:	
C	PN16
D	PN40
E	PN63
F	PN100
G	PN160
H	PN250
I	PN320
J	PN400
K	150 lbs.
L	300 lbs.
M	600 lbs.
N	900 lbs.
O	1500 lbs.
P	2500 lbs.
Y9	others, please specify

Please see next page

IBFD-36-HT continuation	
Code	Description
4.4 Flange face process connection flange:	
E0	EN 1092-1 Form A (without sealing strip; Ra 3.2-12.5µm)
E1	EN 1092-1 Form B1 (raised sealing strip; Ra 3,2-12,5µm)
E2	EN 1092-1 Form B2 (raised sealing strip; Ra 0,8-3,2µm)
E3	EN 1092-1 Form C (tongue; Ra 0,8-3,2µm)
E4	EN 1092-1 Form D (groove; Ra 0,8-3,2µm)
A1	ASME B 16.5 Raised Face (RF)
A2	ASME B 16.5 Raised Face Smooth Finish (RFSF)
A3	ASME B 16.5 Flat Face (FF)
A4	ASME B 16.5 Ring-Type Joint (RTJ)
A5	ASME B 16.5 Tongue (ASME)
A6	ASME B 16.5 Groove (ASME)
D1	DIN Form A (without special demand)
D2	DIN Form B (raised sealing strip ; Rz = 160µm)
D3	DIN Form C (raised sealing strip ; Rz = 160µm)
D4	DIN Form D (raised sealing strip ; Rz = 40µm)
D5	DIN Form E (raised sealing strip ; Rz = 16µm)
D6	DIN Form F (tongue acc. DIN 2512)
D7	DIN Form N (groove acc. DIN 2512)
Y9	others, please specify
4.5 Gasket:	
0	without
C	Sp. wd gasket w/ IR(316) & AR(CS) filling graphite; thickn.: 4.5 mm; max. 450°C (842°F)
D	Sp. wd gasket w/ IR(1.4541)&AR(316SS) flg graphite; thickn.: 4.5 mm; max. 450°C (842°F)
X	Sp. wd gasket w/ IR(1.4541) & AR(1.4541) filling Graphite APX (for higher temperature).
RO	Ring-Joint Seal Type R-Oval ASME B16.20
Y9	others, please specify
4.6 Bolts / nuts:	
0	without
G	DIN 2510 Form L Material: 1.7709 / GA
V	DIN 2510 Form L Material: 1.4923 / V
5	ASME B16.5 Material: A193 Gr. B7 / A194 Gr. 2H (galvanised)
6	ASME B16.5 Material: A193 Gr. B8 Cl.1 / A194 Gr. 8
Y9	others, please specify
5. Design mounting part:	
0	without (provided by others / customer /)
R	mounting stud with flange (standard)
W0	weldolet assembly, stud with flange
Y9	others, please specify
5.1 Material mounting stud:	
P	1.5415 / 16Mo3
E	1.7335 / 13CrMo44
F	1.7380 / 10CrMo910
Q	1.4903, X10CrMoVNb910
Y9	others, please specify

se see next page

Itabar-Flow-Sensors

IBFD-36-HT continuation	
Code	Description
5.2 Standard:	
E	EN 1092-1
A	ASME B 16.5
D	DIN (according to type & pressure rating)
Y	others, please specify
5.3 Nominal size:	
32	DN32
40	DN40
12	1-1/2"
Y9	others, please specify
5.4 Pressure class:	
C	PN16
D	PN40
E	PN63
F	PN100
G	PN160
H	PN250
I	PN320
J	PN400
K	150 lbs.
L	300 lbs.
M	600 lbs.
N	900 lbs.
O	1500 lbs.
P	2500 lbs.
Y9	andere, bitte spezifizieren
5.5 Flange face mounting stud flange:	
E0	EN 1092-1 Form A (without sealing strip; Ra 3.2-12.5µm)
E1	EN 1092-1 Form B1 (raised sealing strip; Ra 3,2-12,5µm)
E2	EN 1092-1 Form B2 (raised sealing strip; Ra 0,8-3,2µm)
E3	EN 1092-1 Form C (tongue; Ra 0,8-3,2µm)
E4	EN 1092-1 Form D (groove; Ra 0,8-3,2µm)
A1	ASME B 16.5 Raised Face (RF)
A2	ASME B 16.5 Raised Face Smooth Finish (RFSF)
A3	ASME B 16.5 Flat Face (FF)
A4	ASME B 16.5 Ring-Type Joint (RTJ)
A5	ASME B 16.5 Tongue (ASME)
A6	ASME B 16.5 Groove (ASME)
D1	DIN Form A (without special demand)
D2	DIN Form B (raised sealing strip ; Rz = 160µm)
D3	DIN Form C (raised sealing strip ; Rz = 160µm)
D4	DIN Form D (raised sealing strip ; Rz = 40µm)
D5	DIN Form E (raised sealing strip ; Rz = 16µm)
D6	DIN Form F (tongue acc. DIN 2512)
D7	DIN Form N (groove acc. DIN 2512)
Y9	others, please specify

Please see next page

IBFD-36-HT continuation	
Code	Description
6. End support:	
0	without
P	material: 1.5415 / 16Mo3
E	material: 1.7335 / 13CrMo44
F	material: 1.7380 / 10CrMo910
Q	material: 1.4903, X10CrMoVNb910
Y	others, please specify
7. Pipe insulation:	
KI	without
X	insulation in mm (min. 50mm)
Y	others, please specify
8. Pipe run/flow direction:	
HL	horizontal, left
HR	horizontal, right
VD	vertical, down
VU	vertical, upwards
Y9	others, please specify
9. Condensate vessels:	
K0	without
K5	welded condensate pots; Ø90x17,5mm; Material: 16Mo3 (1.5415; A355 Gr. P1)
K6	welded condensate pots; Ø90x17,5mm; Material: 13CrMo44 (1.7335; A355 Gr. P11)
K7	welded condensate pots; Ø90x17,5mm; Material: 10CrMo910 (1.7380; A335 Gr. P22)
K8	welded condensate pots; Ø90x17,5mm; Material: X10CrMoVNb91 (1.4903; A335 Gr. P91)
Y99	others, please specify
10. Differential pressure connection:	
AS2	1 pair welding connection Ø21.3x3,2mm - welding end (remote version)
AS3	1 pair welding connection Ø21.3x6,3mm - welding end (remote version)
AS4	1 pair welding connection Ø24x4,0mm - welding end (remote version)
Y99	others, please specify
11. Shut-off valve (initial shut-off):	
A00	without
A13	1 pair valve, PN400, hsg: 1.5415/16Mo3, Ø21,3x3,2mm/Ø21,3x3,2mm; pckg: Graph.
A14	1 pair valve, PN400, hsg: 1.7335/13CrMo44, Ø21,3x3,2mm/Ø21,3x3,2mm; pckg: Graph.
A15	1 pair valve, PN400, hsg: 1.7380/10CrMo910, Ø21,3x3,2mm/Ø21,3x3,2mm; pckg: Graph.
A16	1 p. valve, PN400, hsg: 1.4903/X10CrMoVNb910, Ø21,3x3,2mm/Ø21,3x3,2mm; pckg: Graph.
A23	1 pair valve, PN400, hsg: 1.5415/16Mo3, Ø21,3x6,3mm/Ø21,3x6,3mm; pckg: Graph.
A24	1 pair valve, PN400, hsg: 1.7335/13CrMo44, Ø21,3x6,3mm/Ø21,3x6,3mm; pckg: Graph.
A25	1 pair valve, PN400, hsg: 1.7380/10CrMo910, Ø21,3x6,3mm/Ø21,3x6,3mm; pckg: Graph.
A26	1 p. valve, PN400, hsg: 1.4903/X10CrMoVNb910, Ø21,3x6,3mm/Ø21,3x6,3mm; pckg: Graph.
A33	1 pair valve, PN400, hsg: 1.5415/16Mo3, Ø21,3x3,2mm/Ø14x2,5mm; pckg: Graph.
A34	1 pair valve, PN400, hsg: 1.7335/13CrMo44, Ø21,3x3,2mm/Ø14x2,5mm; pckg: Graph.
A35	1 pair valve, PN400, hsg: 1.7380/10CrMo910, Ø21,3x3,2mm/Ø14x2,5mm; pckg: Graph.
A36	1 pair valve, PN400, hsg: 1.4903/X10CrMoVNb910, Ø21,3x3,2mm/Ø14x2,5mm; pckg: Graph.
A43	1 pair valve, PN400, hsg: 1.5415/16Mo3, Ø21,3x6,3mm/Ø14x2,5mm; pckg: Graph.
A44	1 pair valve, PN400, hsg: 1.7335/13CrMo44, Ø21,3x6,3mm/Ø14x2,5mm; pckg: Graph.
A45	1 pair valve, PN400, hsg: 1.7380/10CrMo910, Ø21,3x6,3mm/Ø14x2,5mm; pckg: Graph.
A46	1 pair valve, PN400, hsg: 1.4903/X10CrMoVNb910, Ø21,3x6,3mm/Ø14x2,5mm; pckg: Graph.
Y99	others, please specify

Please see next page

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IBFD-36-HT continuation	
Code	Description
12. Shut-off valve (secondary shut-off):	
A00	without
A13	1 pair valve,PN400,hsg:1.5415/16Mo3, Ø21,3x3,2mm/Ø21,3x3,2mm;pckg:Graph.
A14	1 pair valve,PN400,hsg:1.7335/13CrMo44, Ø21,3x3,2mm/Ø21,3x3,2mm;pckg:Graph.
A15	1 pair valve,PN400,hsg:1.7380/10CrMo910, Ø21,3x3,2mm/Ø21,3x3,2mm;pckg:Graph.
A16	1 p. valve,PN400,hsg:1.4903/X10CrMoVNb910, Ø21,3x3,2mm/Ø21,3x3,2mm;pckg:Graph.
A23	1 pair valve,PN400,hsg:1.5415/16Mo3, Ø21,3x6,3mm/Ø21,3x6,3mm;pckg:Graph.
A24	1 pair valve,PN400,hsg:1.7335/13CrMo44, Ø21,3x6,3mm/Ø21,3x6,3mm;pckg:Graph.
A25	1 pair valve,PN400,hsg:1.7380/10CrMo910, Ø21,3x6,3mm/Ø21,3x6,3mm;pckg:Graph.
A26	1 p. valve,PN400,hsg:1.4903/X10CrMoVNb910, Ø21,3x6,3mm/Ø21,3x6,3mm;pckg:Graph.
A33	1 pair valve,PN400,hsg:1.5415/16Mo3, Ø21,3x3,2mm/Ø14x2,5mm;pckg:Graph.
A34	1 pair valve,PN400,hsg:1.7335/13CrMo44, Ø21,3x3,2mm/Ø14x2,5mm;pckg:Graph.
A35	1 pair valve,PN400,hsg:1.7380/10CrMo910, Ø21,3x3,2mm/Ø14x2,5mm;pckg:Graph.
A36	1 pair valve,PN400,hsg:1.4903/X10CrMoVNb910, Ø21,3x3,2mm/Ø14x2,5mm;pckg:Graph.
A43	1 pair valve,PN400,hsg:1.5415/16Mo3, Ø21,3x6,3mm/Ø14x2,5mm;pckg:Graph.
A44	1 pair valve,PN400,hsg:1.7335/13CrMo44, Ø21,3x6,3mm/Ø14x2,5mm;pckg:Graph.
A45	1 pair valve,PN400,hsg:1.7380/10CrMo910, Ø21,3x6,3mm/Ø14x2,5mm;pckg:Graph.
A46	1 pair valve,PN400,hsg:1.4903/X10CrMoVNb910, Ø21,3x6,3mm/Ø14x2,5mm;pckg:Graph.
Y99	others, please specify
13. Special design:	
0	without
Y	others, please specify

IBFD-26/36-HTG

C.2.4 Itabar for Superheated Steam (welding construction)

Types: IBFD-26/36-HTG (up to 5802 psi [400 bar])

a.) Description

Sensor series IBFD-HTG is designed to measure volumetric / mass flow of superheated steam. Because of high safety related requirements the sensor is only manufactured in a welded construction, which afterwards is stress-free annealing. A (German) VdTÜV component test is done for certain types of IBFD-26 HTG.

Materials	Max. steam temperature
1.5415 (15 Mo 3)	986 °F / 530 °C
1.7335 (10 CrMo 4 4)	1040 °F / 560 °C
1.7380 (10 CrMo 9 10)	1094°F / 590 °C
1.4903 (10 CrMoVNB 91)	1202°F / 650 °C

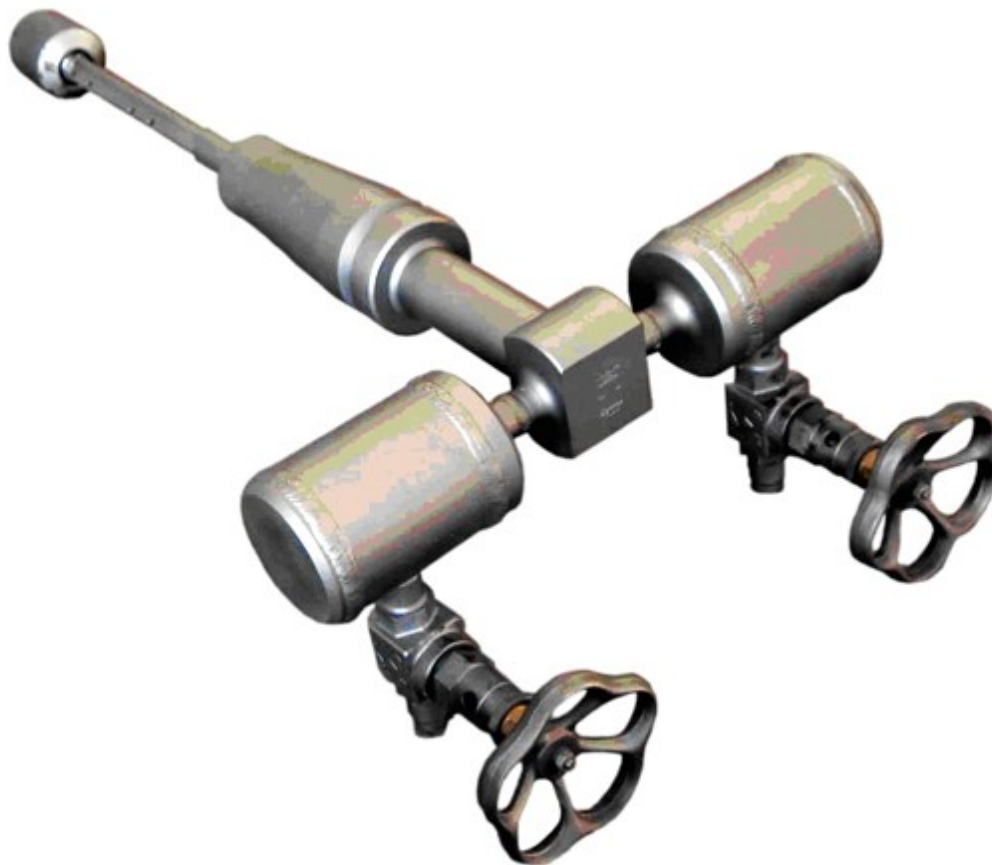
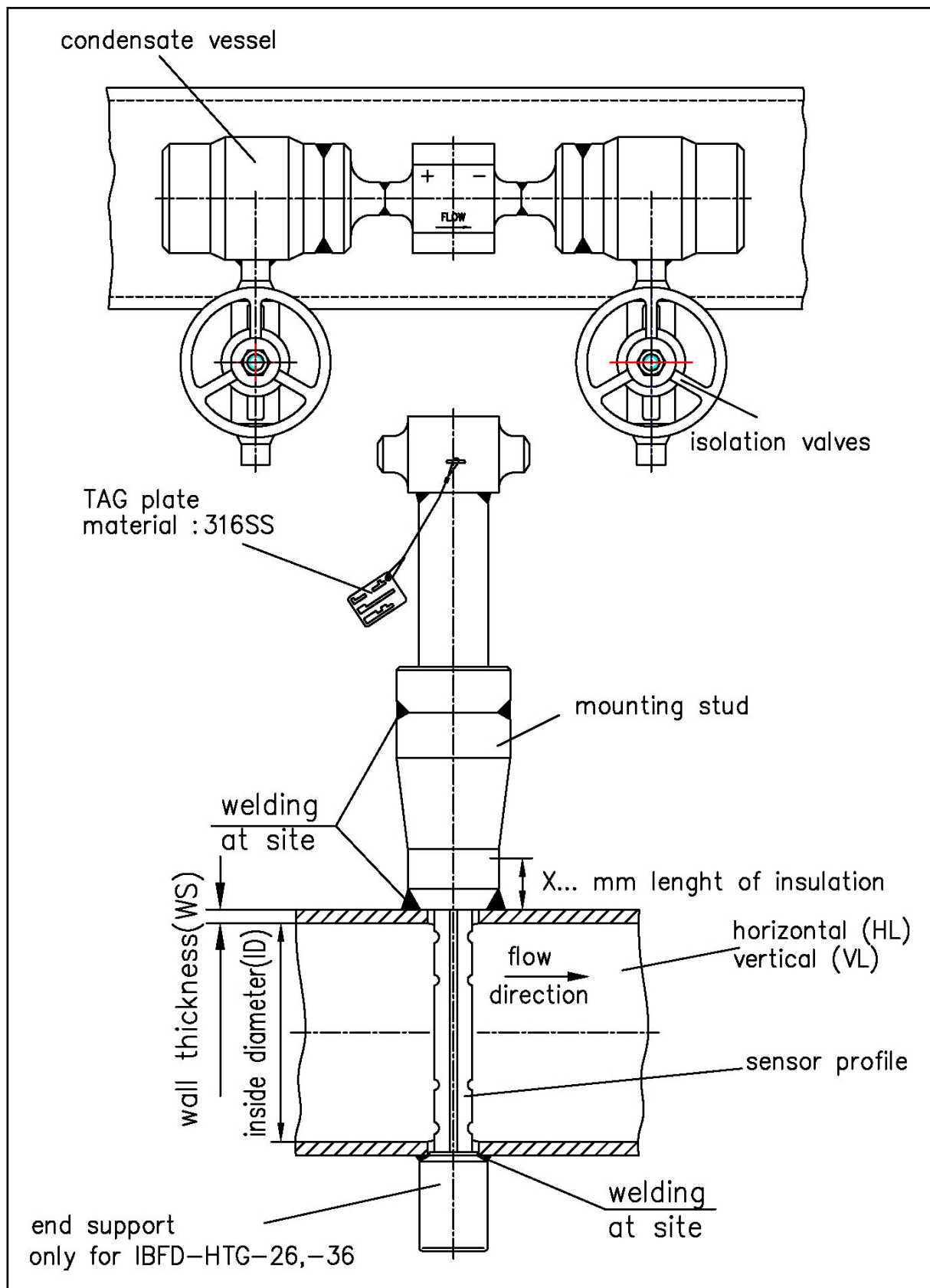


Fig 59: IBFD-HTG

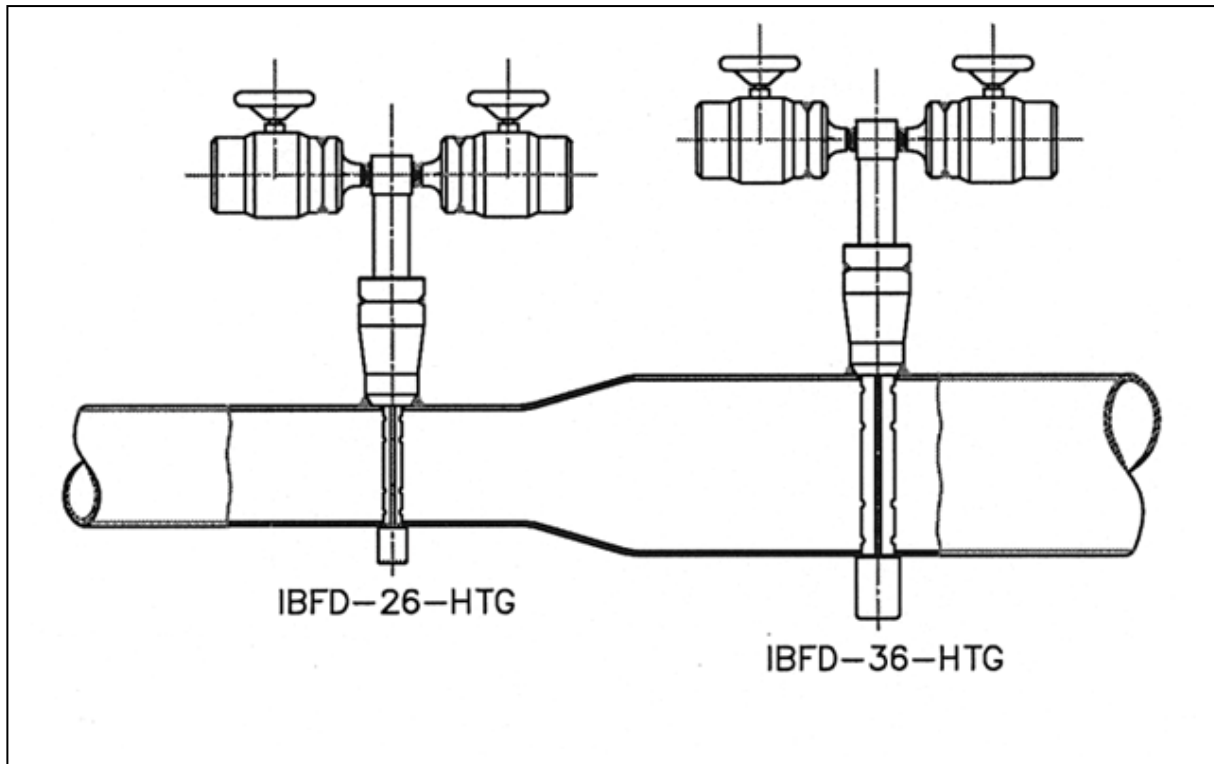
Itabar-Flow-Sensors

b) Drawing for IBFD-HTG



c.) Order Data for Itabar® Series IBFD-26/36-HTG

c.1) Sensor type:



Pipe Size DN	Pipe Size Inches	Maximum flow volume Q_v in m³/h	
		IBFD -26-HTG	IBFD -36-HTG
100	4	1103	---
125	5	1456	---
150	6	1810	---
200	8	2516	---
250	10	3286	---
300	12	4119	4501
350	14	4925	5399
400	16	5706	6300
500	20	7341	8018
600	24	8948	9716

These values are for water of $\rho = 0,9982 \text{ kg/l}$ SGU and at a temperature $T = 20 \text{ }^{\circ}\text{C}$. To calculate volumetric or mass flow of fluids with other densities see chapter 6 „Specifications of DP Sensors with WINFLOW“.

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d) Order Specifications Itabar-FlowSensors, Series IBFD-*-HTG

d1) IBFD-26-HTG

ITABAR®-FLOW-SENSOR for Superheated Steam, flanged version	
Code	Description
1. Type:	
IBFD-26-HTG	Sensor Ø25,4mm as complete welded construction / for superheated steam with endsupport
2. Pipe (duct) size: (ID/WT):	
DN100	DN 100 / 4"
DN125	DN 125 / 5"
DN150	DN 150 / 6"
DN200	DN 200 / 8"
DN250	DN 250 / 10"
DN300	DN 300 / 12"
DN350	DN 350 / 14"
DN400	DN 400 / 16"
DN450	DN 450 / 18"
DN500	DN 500 / 20"
DN600	DN 600 / 24"
Y9	others, please specify
3. Material sensor / process connection:	
P	1.5415 / 16Mo3
E	1.7335 / 13CrMo44
F	1.7380 / 10CrMo910
Q	1.4903 / X10CrMoVNb910
Y	others, please specify
4. Pipe insulation	
KI	without
X	insulation in mm (min. 50mm)
Y	others, please specify
5. Pipe run/flow direction:	
HL	horizontal, left
HR	horizontal, right
VD	vertical, down
VU	vertical, upwards
Y9	others, please specify
6. Condensate vessels:	
K0	without
K5	welded cond. pots; Ø90x17,5mm; Mat.: 16Mo3 (1.5415; A355 Gr. P1)
K6	welded cond. pots; Ø90x17,5mm; Mat.: 13CrMo44 (1.7335; A355 Gr. P11)
K7	welded cond. pots; Ø90x17,5mm; Mat.: 10CrMo910 (1.7380; A335 Gr. P22)
K8	welded cond. pots; Ø90x17,5mm; Mat.: X10CrMoVNb91 (1.4903; A335 Gr. P91)
Y99	others, please specify
7. Differential pressure connection:	
AS2	1 pair welding connection Ø21.3x3,2mm - welding end
AS3	1 pair welding connection Ø21.3x6,3mm - welding end
AS4	1 pair welding connection Ø24x4,0mm - welding end
Y99	others, please specify

Please see next page

IBFD-26-HTG continuation	
Code	Description
8. Shut-off valve (initial shut-off):	
A00	without
A13	1 pair valve, PN400, hsg: 1.5415/16Mo3, Ø21,3x3,2mm/Ø21,3x3,2mm; pckg: Graph.
A14	1 pair valve, PN400, hsg: 1.7335/13CrMo44, Ø21,3x3,2mm/Ø21,3x3,2mm; pckg: Graph.
A15	1 pair valve, PN400, hsg: 1.7380/10CrMo910, Ø21,3x3,2mm/Ø21,3x3,2mm; pckg: Graph.
A16	1 p. valve, PN400, hsg: 1.4903/X10CrMoVNb910, Ø21,3x3,2mm/Ø21,3x3,2mm; pckg: Graph.
A23	1 pair valve, PN400, hsg: 1.5415/16Mo3, Ø21,3x6,3mm/Ø21,3x6,3mm; pckg: Graph.
A24	1 pair valve, PN400, hsg: 1.7335/13CrMo44, Ø21,3x6,3mm/Ø21,3x6,3mm; pckg: Graph.
A25	1 pair valve, PN400, hsg: 1.7380/10CrMo910, Ø21,3x6,3mm/Ø21,3x6,3mm; pckg: Graph.
A26	1 p. valve, PN400, hsg: 1.4903/X10CrMoVNb910, Ø21,3x6,3mm/Ø21,3x6,3mm; pckg: Graph.
A33	1 pair valve, PN400, hsg: 1.5415/16Mo3, Ø21,3x3,2mm/Ø14x2,5mm; pckg: Graph.
A34	1 pair valve, PN400, hsg: 1.7335/13CrMo44, Ø21,3x3,2mm/Ø14x2,5mm; pckg: Graph.
A35	1 pair valve, PN400, hsg: 1.7380/10CrMo910, Ø21,3x3,2mm/Ø14x2,5mm; pckg: Graph.
A36	1 pair valve, PN400, hsg: 1.4903/X10CrMoVNb910, Ø21,3x3,2mm/Ø14x2,5mm; pckg: Graph.
A43	1 pair valve, PN400, hsg: 1.5415/16Mo3, Ø21,3x6,3mm/Ø14x2,5mm; pckg: Graph.
A44	1 pair valve, PN400, hsg: 1.7335/13CrMo44, Ø21,3x6,3mm/Ø14x2,5mm; pckg: Graph.
A45	1 pair valve, PN400, hsg: 1.7380/10CrMo910, Ø21,3x6,3mm/Ø14x2,5mm; pckg: Graph.
A46	1 pair valve, PN400, hsg: 1.4903/X10CrMoVNb910, Ø21,3x6,3mm/Ø14x2,5mm; pckg: Graph.
Y99	others, please specify
9. Shut-off valve (secondary shut-off):	
A00	without
A13	1 pair valve, PN400, hsg: 1.5415/16Mo3, Ø21,3x3,2mm/Ø21,3x3,2mm; pckg: Graph.
A14	1 pair valve, PN400, hsg: 1.7335/13CrMo44, Ø21,3x3,2mm/Ø21,3x3,2mm; pckg: Graph.
A15	1 pair valve, PN400, hsg: 1.7380/10CrMo910, Ø21,3x3,2mm/Ø21,3x3,2mm; pckg: Graph.
A16	1 p. valve, PN400, hsg: 1.4903/X10CrMoVNb910, Ø21,3x3,2mm/Ø21,3x3,2mm; pckg: Graph.
A23	1 pair valve, PN400, hsg: 1.5415/16Mo3, Ø21,3x6,3mm/Ø21,3x6,3mm; pckg: Graph.
A24	1 pair valve, PN400, hsg: 1.7335/13CrMo44, Ø21,3x6,3mm/Ø21,3x6,3mm; pckg: Graph.
A25	1 pair valve, PN400, hsg: 1.7380/10CrMo910, Ø21,3x6,3mm/Ø21,3x6,3mm; pckg: Graph.
A26	1 p. valve, PN400, hsg: 1.4903/X10CrMoVNb910, Ø21,3x6,3mm/Ø21,3x6,3mm; pckg: Graph.
A33	1 pair valve, PN400, hsg: 1.5415/16Mo3, Ø21,3x3,2mm/Ø14x2,5mm; pckg: Graph.
A34	1 pair valve, PN400, hsg: 1.7335/13CrMo44, Ø21,3x3,2mm/Ø14x2,5mm; pckg: Graph.
A35	1 pair valve, PN400, hsg: 1.7380/10CrMo910, Ø21,3x3,2mm/Ø14x2,5mm; pckg: Graph.
A36	1 pair valve, PN400, hsg: 1.4903/X10CrMoVNb910, Ø21,3x3,2mm/Ø14x2,5mm; pckg: Graph.
A43	1 pair valve, PN400, hsg: 1.5415/16Mo3, Ø21,3x6,3mm/Ø14x2,5mm; pckg: Graph.
A44	1 pair valve, PN400, hsg: 1.7335/13CrMo44, Ø21,3x6,3mm/Ø14x2,5mm; pckg: Graph.
A45	1 pair valve, PN400, hsg: 1.7380/10CrMo910, Ø21,3x6,3mm/Ø14x2,5mm; pckg: Graph.
A46	1 pair valve, PN400, hsg: 1.4903/X10CrMoVNb910, Ø21,3x6,3mm/Ø14x2,5mm; pckg: Graph.
Y99	others, please specify
10. Special design:	
0	without
Y	others, please specify

Itabar-Flow-Sensors

d2) IBFD-36-HTG

ITABAR®-FLOW-SENSOR for Superheated Steam, flanged version	
Code	Description
1. Type:	
IBFD-36-HTG	Sensor Ø42mm as complete welded construction / for superheated steam with end support
2. Pipe (duct) size: (ID/WT):	
DN100	DN 100 / 4"
DN125	DN 125 / 5"
DN150	DN 150 / 6"
DN200	DN 200 / 8"
DN250	DN 250 / 10"
DN300	DN 300 / 12"
DN350	DN 350 / 14"
DN400	DN 400 / 16"
DN450	DN 450 / 18"
DN500	DN 500 / 20"
DN600	DN 600 / 24"
Y9	others, please specify
3. Material sensor / process connection:	
P	1.5415 / 16Mo3
E	1.7335 / 13CrMo44
F	1.7380 / 10CrMo910
Q	1.4903 / X10CrMoVNb910
Y	others, please specify
4. Pipe insulation	
KI	without
X	insulation in mm (min. 50mm)
Y	others, please specify
5. Pipe run/flow direction:	
HL	horizontal, left
HR	horizontal, right
VD	vertical, down
VU	vertical, upwards
Y9	others, please specify
6. Condensate vessels:	
K0	without
K5	welded cond. pots; Ø90x17,5mm; Mat.: 16Mo3 (1.5415; A355 Gr. P1)
K6	welded cond. pots; Ø90x17,5mm; Mat.: 13CrMo44 (1.7335; A355 Gr. P11)
K7	welded cond. pots; Ø90x17,5mm; Mat.: 10CrMo910 (1.7380; A335 Gr. P22)
K8	welded cond. pots; Ø90x17,5mm; Mat.: X10CrMoVNb91 (1.4903; A335 Gr. P91)
Y99	others, please specify
7. Differential pressure connection:	
AS2	1 pair welding connection Ø21.3x3,2mm - welding end
AS3	1 pair welding connection Ø21.3x6,3mm - welding end
AS4	1 pair welding connection Ø24x4,0mm - welding end
Y99	others, please specify

Please see next page

IBFD-36-HTG continuation	
Code	Description
8. Shut-off valve (initial shut-off):	
A00	without
A13	1 pair valve, PN400, hsg: 1.5415/16Mo3, Ø21,3x3,2mm/Ø21,3x3,2mm; pckg: Graph.
A14	1 pair valve, PN400, hsg: 1.7335/13CrMo44, Ø21,3x3,2mm/Ø21,3x3,2mm; pckg: Graph.
A15	1 pair valve, PN400, hsg: 1.7380/10CrMo910, Ø21,3x3,2mm/Ø21,3x3,2mm; pckg: Graph.
A16	1 p. valve, PN400, hsg: 1.4903/X10CrMoVNb910, Ø21,3x3,2mm/Ø21,3x3,2mm; pckg: Graph.
A23	1 pair valve, PN400, hsg: 1.5415/16Mo3, Ø21,3x6,3mm/Ø21,3x6,3mm; pckg: Graph.
A24	1 pair valve, PN400, hsg: 1.7335/13CrMo44, Ø21,3x6,3mm/Ø21,3x6,3mm; pckg: Graph.
A25	1 pair valve, PN400, hsg: 1.7380/10CrMo910, Ø21,3x6,3mm/Ø21,3x6,3mm; pckg: Graph.
A26	1 p. valve, PN400, hsg: 1.4903/X10CrMoVNb910, Ø21,3x6,3mm/Ø21,3x6,3mm; pckg: Graph.
A33	1 pair valve, PN400, hsg: 1.5415/16Mo3, Ø21,3x3,2mm/Ø14x2,5mm; pckg: Graph.
A34	1 pair valve, PN400, hsg: 1.7335/13CrMo44, Ø21,3x3,2mm/Ø14x2,5mm; pckg: Graph.
A35	1 pair valve, PN400, hsg: 1.7380/10CrMo910, Ø21,3x3,2mm/Ø14x2,5mm; pckg: Graph.
A36	1 pair valve, PN400, hsg: 1.4903/X10CrMoVNb910, Ø21,3x3,2mm/Ø14x2,5mm; pckg: Graph.
A43	1 pair valve, PN400, hsg: 1.5415/16Mo3, Ø21,3x6,3mm/Ø14x2,5mm; pckg: Graph.
A44	1 pair valve, PN400, hsg: 1.7335/13CrMo44, Ø21,3x6,3mm/Ø14x2,5mm; pckg: Graph.
A45	1 pair valve, PN400, hsg: 1.7380/10CrMo910, Ø21,3x6,3mm/Ø14x2,5mm; pckg: Graph.
A46	1 pair valve, PN400, hsg: 1.4903/X10CrMoVNb910, Ø21,3x6,3mm/Ø14x2,5mm; pckg: Graph.
Y99	others, please specify
9. Shut-off valve (secondary shut-off):	
A00	without
A13	1 pair valve, PN400, hsg: 1.5415/16Mo3, Ø21,3x3,2mm/Ø21,3x3,2mm; pckg: Graph.
A14	1 pair valve, PN400, hsg: 1.7335/13CrMo44, Ø21,3x3,2mm/Ø21,3x3,2mm; pckg: Graph.
A15	1 pair valve, PN400, hsg: 1.7380/10CrMo910, Ø21,3x3,2mm/Ø21,3x3,2mm; pckg: Graph.
A16	1 p. valve, PN400, hsg: 1.4903/X10CrMoVNb910, Ø21,3x3,2mm/Ø21,3x3,2mm; pckg: Graph.
A23	1 pair valve, PN400, hsg: 1.5415/16Mo3, Ø21,3x6,3mm/Ø21,3x6,3mm; pckg: Graph.
A24	1 pair valve, PN400, hsg: 1.7335/13CrMo44, Ø21,3x6,3mm/Ø21,3x6,3mm; pckg: Graph.
A25	1 pair valve, PN400, hsg: 1.7380/10CrMo910, Ø21,3x6,3mm/Ø21,3x6,3mm; pckg: Graph.
A26	1 p. valve, PN400, hsg: 1.4903/X10CrMoVNb910, Ø21,3x6,3mm/Ø21,3x6,3mm; pckg: Graph.
A33	1 pair valve, PN400, hsg: 1.5415/16Mo3, Ø21,3x3,2mm/Ø14x2,5mm; pckg: Graph.
A34	1 pair valve, PN400, hsg: 1.7335/13CrMo44, Ø21,3x3,2mm/Ø14x2,5mm; pckg: Graph.
A35	1 pair valve, PN400, hsg: 1.7380/10CrMo910, Ø21,3x3,2mm/Ø14x2,5mm; pckg: Graph.
A36	1 pair valve, PN400, hsg: 1.4903/X10CrMoVNb910, Ø21,3x3,2mm/Ø14x2,5mm; pckg: Graph.
A43	1 pair valve, PN400, hsg: 1.5415/16Mo3, Ø21,3x6,3mm/Ø14x2,5mm; pckg: Graph.
A44	1 pair valve, PN400, hsg: 1.7335/13CrMo44, Ø21,3x6,3mm/Ø14x2,5mm; pckg: Graph.
A45	1 pair valve, PN400, hsg: 1.7380/10CrMo910, Ø21,3x6,3mm/Ø14x2,5mm; pckg: Graph.
A46	1 pair valve, PN400, hsg: 1.4903/X10CrMoVNb910, Ø21,3x6,3mm/Ø14x2,5mm; pckg: Graph.
Y99	others, please specify
10. Special design:	
0	without
Y	others, please specify

Itabar-Flow-Sensors

e) Order Specification for Condensate Vessels, Instrument Connection and Shut-Off-Valves for Itabar-Flow-Sensors type IBFD-HT/HTG

e1) Pressure Rating Assembly Flange:

		°F °C	572 300	662 350	752 400	842 450	932 500	950 510	Operating temperature								968 520	986 530	1004 540	1022 550	1040 560	1058 570	1076 580	1112 600	1148 620
Code	Material	Pressure Rating	Max. operating pressure (psi g) Max. operating pressure (bar)																						
C1	C22.8	PN 16 / 150 lbs	138 9.5	87 6	87 6	72.5 5																			
S1	1.4571		167 11.5	159.5 11	159.5 11	145 10																			
P1	1.5415		159.5 11	145 10	138 9.5	130.5 9	116 8																		
R1	1.7335		174 12	159.5 11	145 10	138 9.5	138 9.5	116 8	101.5 7	87 6	72.5 5	58 4													
C2	C22.8	PN 40 / 150 lbs	348 24	145 10																					
S2	1.4571		406 28	377 26	362.5 25	348 24																			
P2	1.5415		391.5 27	362.5 25	333.5 23	319 22	304.5 21																		
R2	1.7335		435 30	391.5 27	377 26	348 24	348 24	290 20	246.5 17	217.5 15	188.5 13	145 10													
C3	C22.8	PN63 / 300 lbs	345 24	145 10																					
S3	1.4571		406 28	377 26	362.5 25	348 24																			
P3	1.5415		391.5 27	362.5 25	333.5 23	319 22	304.5 21																		
R3	1.7335		435 30	391.5 27	377 26	348 24	348 24	290 20	246.5 17	217.5 15	188.5 13	145 10													
V3	1.7380		493 34	449.5 31	435 30	406 28	406 28	348 24	319 22	275.5 19	261 18	217.5 15	174 12												
Q3	1.4903		551 38	507.5 35	493 34	493 34	478.5 33	420.5 29	391.5 27	348 24	333.5 23	275.5 19	246.5 17												
C4	C22.8	PN100 / 600 lbs	870 60	798 55																					
S4	1.4571		1001 69	957 66	928 64	870 60																			
P4	1.5415		957 66	914 63	856 59	827 57	798 55																		
R4	1.7335		1059 73	986 68	928 64	885 61	856 59	725 50	638 44	537 37	450 31	377 26													
V4	1.7380		1117 77	1044 72	986 68	942 65	928 64	798 55	711 49	594.5 41	508 35	435 30	406 28												
Q4	1.4903		1175 81	1088 75	1044 72	1001 69	986 68	856 59	783 54	667 46	566 39	508 35	479 33												
C5	C22.8	PN160 / 1500 lbs	1392 96	1305 90																					
S5	1.4571		1595 110	1523 105	1378 95	1363 94																			
P5	1.5415		1537 106	1450 100	1363 94	1320 91	1276 88																		
R5	1.7335		1682 116	1566 108	1494 103	1407 97	1363 94	1160 80	1015 70	870 60	725 50	595 41													
V5	1.7380		1769 122	1653 114	1581 109	1508 104	1465 101	1247 86	1102 76	957 66	812 56	682 47	653 45												
Q5	1.4903		1847 126	1740 120	1668 115	1595 110	1552 107	1465 101	1175 81	1044 72	899 62	769 53	740 51												
C6	C22.8	PN250 / 1500 lbs	2785 192	2031 140																					
S6	1.4571		3060 211	2393 165	2321 160	2176 150																			
P6	1.5415		3089 213	2277 157	2147 148	2074 143	2002 138																		
R6	1.7335		3379 233	2466 170	2335 161	2205 152	2147 148	1740 120	1392 96	1247 86	1088 75	928 64													
V6	1.7380		3423 236	2582 178	2466 170	2350 162	2219 153	1755 121	1421 98	1291 89	1131 78	986 68	856 59	769 53											
Q6	1.4903		3510 242	2669 184	2553 176	2437 168	2306 159	1856 128	1537 106	1407 97	1233 85	1073 74	943 65	856 59											
C7	C22.8	PN320 / 1500 lbs	2785 192	2611 180																					
S7	1.4571		3060 211	3046 210	2901 200	2640 182																			
P7	1.5415		3089 213	2915 201	2741 189	2654 183	2567 177																		
R7	1.7335		3379 233	3147 217	2988 206	2828 195	2756 190	2147 148	1740 120	1537 106	1378 95	1189 82													
V7	1.7380		3539 244	3307 228	3162 218	3017 208	2843 196	2234 154	1827 126	1653 114	1450 100	1276 88	1102 76	986 68											
Q7	1.4903		3640 251	3394 234	3249 224	3104 214	2930 202	2335 161	1929 133	1755 121	1552 107	1378 95	1189 82	1088 75											
R8	1.7335	PN400 / 2500 lbs	4395 303	4105 283	3931 271	3742 258	3466 239	2756 190	2147 148	1973 136	1668 115	1523 105													
V8	1.7380		4424 305	4134 285	3945 272	3771 260	3553 245	2828 195	2277 157	2060 142	1813 125	1595 110	1378 95	1233 85											
Q8	1.4903		4525 312	4235 292	4047 279	3873 267	3655 252	2930 202	2379 164	2161 149	1915 132	1697 117	1479 102	1334 92	1233 85	1160 80	1010 65								

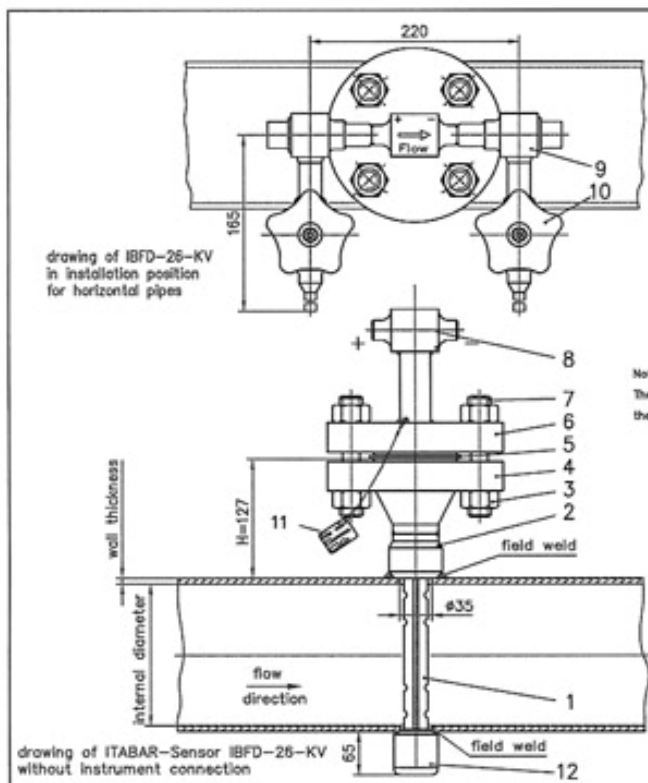
e2) Combination Condensate Pots / Shut-Off Valves

Basically it is possible to use a combination of condensate pots and shut-off valves for sensor types IBFD-/IBFD21 and IBFD -25/26. Such combinations are welded directly onto the sensor head. Preferably such a construction is used in applications with high differential pressures.

Advantages are:

- low weight
- smaller dimensions
- quick local installation

Schematic drawing	Description	Material	Code	Max. Operating Data	
				p PSI (bar)	At T (°F) (°C)
	Combination of condensate pot and shut-off valve process connection: welding boss 21 mm with graphite packing	15 Mo 3 (1.5415)	KV02	3675 (250)	248 (120)
				1764 (121)	932 (500)
		13 CrMo 4 4 (1.7335)	KV03	3675 (250)	248 (120)
				1837 (129)	1022 (550)
		10 CrMo 910 (1.7380)	KV04	1160 (80)	1742 (530)



drawing of IBFD-26-KV in installation position for horizontal pipes

drawing of ITABAR-Sensor IBFD-26-KV without instrument connection

client	
quotation/order	
TAG no.	
internal pipe diameter	
wall thickness	
medium	
pressure	
temperature	
density	

pipe line

horizontal ☐ vertical ☐

Note:

The area of application of the arrangement depends on the used materials, the pressure rating, the flanges and the combination of alignment vessel and stop valve.

12	closed end support	1	13CrMo44
11	TAG plate	1	316SS
10	shut-off valve	2	13CrMo44
9	condensation vessel	2	13CrMo44
8	sensor head with weld ends	1	13CrMo44
7	bolts M24	4	21 CrMo 57
6	sensor flange DN40 PN250	1	13CrMo44
5	gasket spiral wound	1	13CrMo44/Graph
4	flange DN40 PN250	1	DN 2025 13CrMo44
3	bolts M24	8	DN 2310 21 CrMo 57
2	mounting stud	1	13CrMo44
1	sensor profile #25	1	13CrMo44

item description

ITABAR-Flow-Sensor for steam

type IBFD-26-KV

Des. 22.06.99/21.1.2003

INTR-A-AUTOMATION GmbH

Otto-Hahn-Straße 20

41515 Grevenbroich

Kalkungs-Weg

ZSON/KZIBFD/PS049e00

Rev. 0

1/1

Itabar-Flow-Sensors

e3) Design Data Condensate Vessel

One important requirement for a trouble-free functioning of the ITABAR steam sensors is that the transition process from steam to condensate only takes place inside the condensate pots designed for this purpose. With this in mind different style condensate pots are offered for various operating conditions.

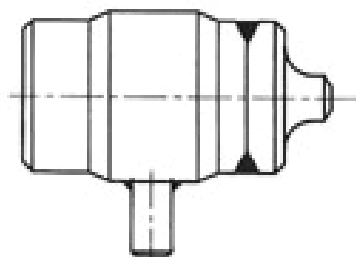


Fig 60: Condensate pots, Dimensions $\varnothing$ 3.54 x 0.69 inches (90 x 17,5 mm) with weld sockets 0.84 inches (21,3 mm)

The following table provides the pressure rating of the condensate pots

Material st steel	Wall thickness	Operating temperature (°F)														
		Max Operating pressure / PSI														
		mm	572	662	752	842	932	950	968	986	1004	1022	1040	1058	1076	1112
1.5415	4	1705	1499	1411	1323	1278	1264	1264								
1.7335	4	1911	1793	1675	1587	1528	1514	1514	1499	1484	1470	1176	1029			
1.7335	12,5				7350	6409	5350	4233	3454	2778	2175	1778	1440			
1.7380	15				7350	6556	5733	4968	4307	3719	3160	2734	2352	2013	1749	
1.4903	15															

e4) Pressure-Temperature Table for Shut-Off-Valves

Code	Description	Pressure Psi	Housing Abbr. name /	material DIN	Connections Inches	Packing	Used for
A13	Shut-off valves	5802 (PN400)	15 Mo 3	1.5415	0.85 x 0.13	graphite	IBFD-HT, IBFD-HTG
A14		5802 (PN400)	13 CrMo 4 4	1.7335	0.85 x 0.13	graphite	
A15		5802 (PN400)	10 CrMo 9 10	1.7380	0.85 x 0.13	graphite	
A16	Shut-off valve (component pest to TRD 110, TRB 801 Nr. 45)	4641 (PN320)	15 Mo 3	1.5415	0.85 x 0.13	graphite	IBFD-HT, IBFD-HTG
A17		4641 (PN320)	13 CrMo 44	1.7335	0.85 x 0.13	graphite	
A18		4641 (PN320)	10 CrMo 9 10	1.7380	0.85 x 0.13	graphite	
A19		5802 (PN400)	15 Mo 3	1.5415	1.06 x 0.2	graphite	
A20		5802 (PN400)	13 CrMo 44	1.7335	1.06 x 0.2	graphite	
A21		5802 (PN400)	10 CrMo 9 10	1.7380	1.06 x 0.2	graphite	
A22		5802 (PN400)	X10 CrMoVNb9-1	1.4903	1.06 x 0.2	graphite	

Code	Maximum operating pressure (PSI / bar) at operating temperature °F (°C)															
	302 (150)	392 (200)	482 (250)	572 (300)	662 (350)	752 (400)	797 (425)	842 (450)	887 (475)	932 (500)	950 (510)	968 (520)	986 (530)	1004 (540)	1022 (550)	1040 (560)
A13	5352	4917	4467	4032	3582	3147	2930	2698	2480	2248	2161	2074	1987	1900	1813	-
	369	339	308	278	247	217	202	186	171	155	149	143	137	131	125	-
A14	5352	4917	4467	4032	3582	3147	2930	2698	2480	2248	2161	2074	1987	1900	1813	-
	369	339	308	278	247	217	202	186	171	155	149	143	137	131	125	-
A15	5802	5802	5802	5802	5439	5076	4714	4351	3989	3626	3481	3336	3191	3046	2901	-
	400	400	400	400	375	350	325	300	275	250	240	230	220	210	200	-

Code	Maximum operating pressure (PSI / bar) at operating temperature °F (°C)																			
	572 (300)	662 (350)	752 (400)	797 (425)	842 (450)	887 (475)	932 (500)	950 (510)	968 (520)	986 (530)	1004 (540)	1022 (550)	1040 (560)	1058 (570)	1076 (580)	1094 (590)	1112 (600)	1130 (610)	1148 (620)	1166 (630)
A16	4641	4612	4322	4250	4177	4105	2596	1973	1552	1247										
	320	318	298	293	288	2836	179	136	107	86										
A17	4641	4641	4641	4641	4641	4569	3974	3321	2625	2147	1726	1349								
	320	320	320	320	320	315	274	229	181	148	119	93								
A18	4641	4641	4641	4641	4641	4641	4148	3626	3147	2727	2350	2002	2002	1479	1276					
	320	320	320	320	320	320	286	250	217	188	162	138	138	102	88					
A19	5569	5105	4670	4670	4670	4583	3989	3350	2669	2045										
	384	352	322	322	322	316	275	231	184	141										
A20	7252	6527	6251	6019	5802	5700	4757	3800	2799	2074	1305	769								
	500	450	431	415	400	393	328	262	193	143	90	53								
A21	7252	6527	6527	6527	6469	6251	6106	5337	4656	4076	3524	3075	2625	2306	1987					
	500	450	450	450	446	431	421	368	321	281	243	212	181	159	137					
A22	7252	6527	6527	6527	6527	6527	6527	6527	6527	6527	6527	5889	5120	4438	3756	3161	2625	2074	1624	1175
	500	450	450	450	450	450	450	450	450	450	450	406	353	306	259	218	181	143	112	81



Fig 61:
Design of Shut-off-
valves

Materials:
16Mo3
13CrMo44
10CrMo910



Fig 62:
Design of Shut-off-
valves

Materials:
16Mo3
13CrMo44
10CrMo910
X10CrMoVNb9-1

FT*D

C.3 Itabar for Steam (Flo Tap-Version))

FTMD

C.3.1 Flo-Tap-Version (Installation under Pressure)

Flo-Tap-Version with Threaded Process Connection and Guide-Rod-Spindles
Types: FTMD-20/21/25/26/35/36 (up to 232 psi [16 bar])

a) Description

The ITABAR-Sensor series FTMD is designed to measure volumetric flow of saturated steam up to an operating pressure of $p_{max} = 235 \text{ psi}$ (16 bar) and a operating temperature of $T_{max} = 572 \text{ °F}$ (300 °C). The sensor construction features a welding boss between the pipe and the sensor-related parts, a compression fitting to seal the sensor and a gate valve to insert the sensor profile into the pipe. The insertion or removal of the sensor is made easy by two guide-rod spindles or (as an option) via a hand wheel driven gearbox.

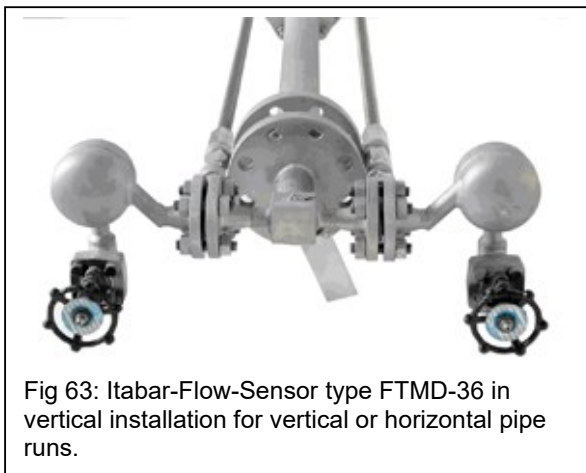
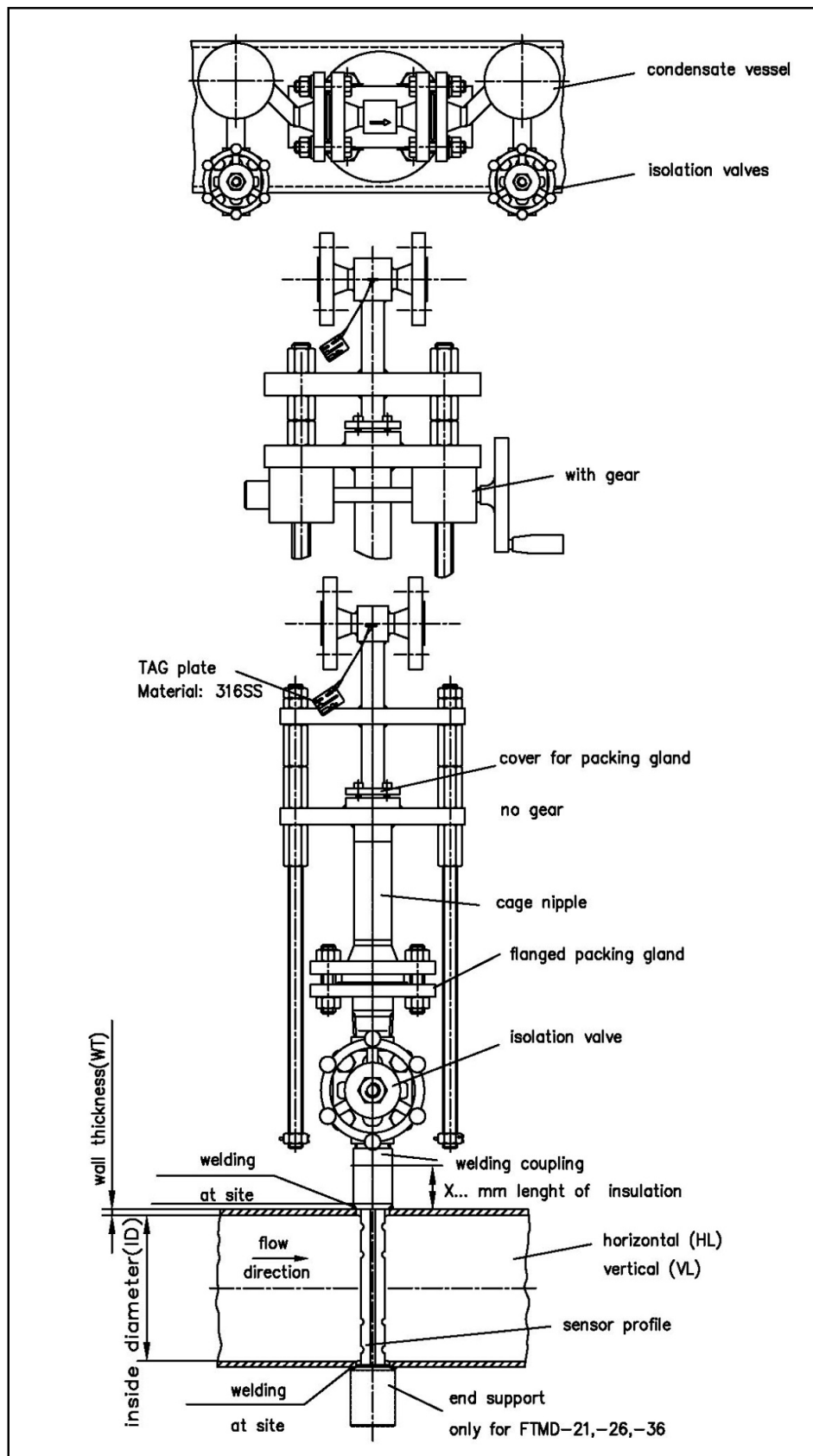


Fig 63: Itabar-Flow-Sensor type FTMD-36 in vertical installation for vertical or horizontal pipe runs.



Fig 64: Itabar-Flow-Sensor type FTMD-36 made of stainless steel for pipe size ID = 336,5 mm

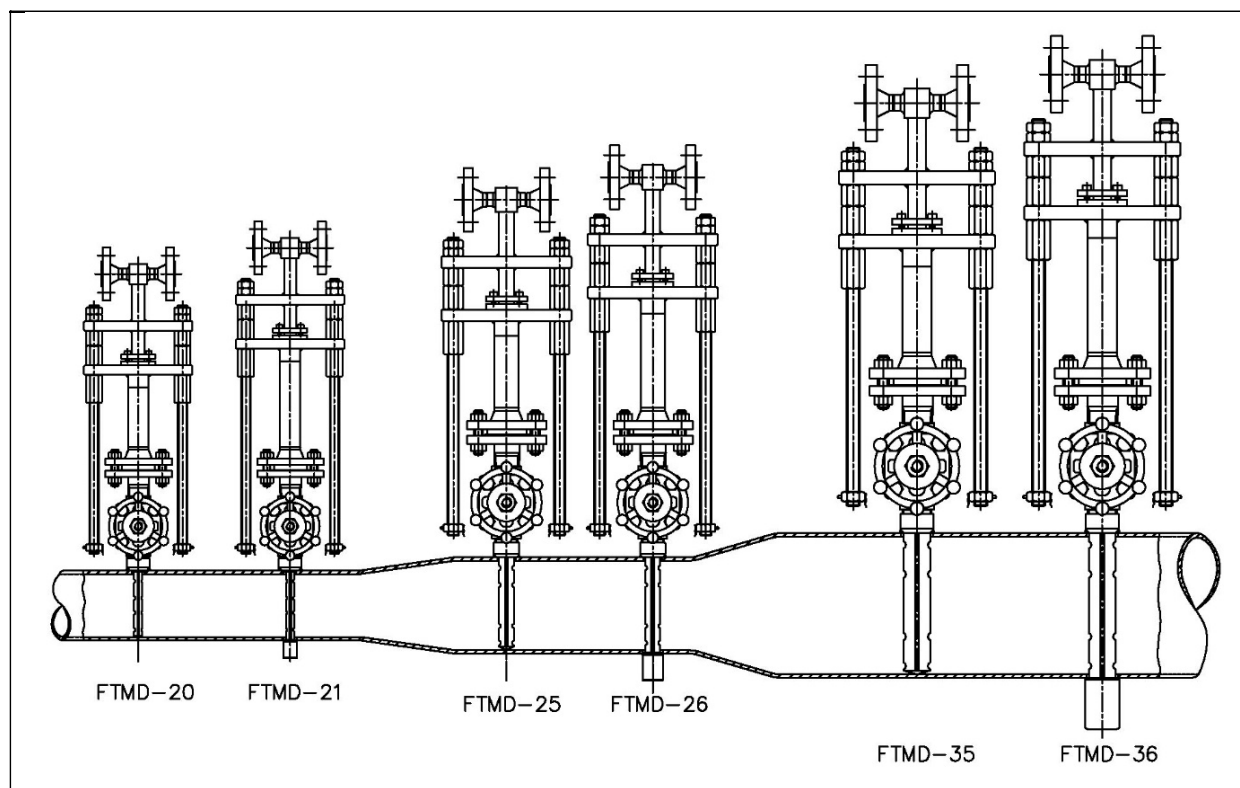
b) Drawing for FTMD



Itabar-Flow-Sensors

c.) Order Data for Itabar® Series FTMD-20/21/25/26/35/36

c.1) Sensor type:



Pipe Size DN	Pipe size (inches)	Maximum allowable volumetric flow in m³/h					
		Sensor type					
		FTMD -20	FTMD -21	FTMD -25	FTMD -26	FTMD -35	FTMD -36
DN 40	1 1/2	40	114	---	---	---	---
DN 50	2	59	161	---	---	---	---
DN 65	2 1/4	93	243	---	---	---	---
DN 80	3	130	328	---	---	---	---
DN 100	4	179	439	205	544	---	---
DN 125	5	---	---	281	719	---	---
DN 150	6	---	---	358	894	---	---
DN 200	8	---	---	515	1242	---	---
DN 250	10	---	---	687	1623	---	---
DN 300	12	---	---	872	2034	1757	4204
DN 350	14	---	---	1053	2433	2142	5067
DN 400	16	---	---	1226	2828	2532	5938
DN 500	20	---	---	1592	3627	3283	7611
DN 600	24	---	---	1949	4423	4052	9327
DN 700	28	---	---	2318	5237	4851	11106
DN 800	32	---	---	2704	6099	5667	12930
DN 900	36	---	---	---	7000	---	14790
DN 1000	40	---	---	---	7921	---	16614
DN 1200	48	---	---	---	9763	---	20450

These values are valid for water with a density of $\rho = 0,9982 \text{ kg/l}$ and a temperature $T = 68 \text{ °F}$ (20 °C). To calculate volumetric flow or mass flow for fluids of another density ρ_1 see chapter 6 „Specifications of pitot tubes with WINFLOW“.

d) Order Specifications Itabar Flow Sensors Series FTMD

d1) FTMD-20/21

ITABAR®-FLOW-SENSOR for Steam, threaded connection.	
Code	Description
1. Type:	
FTMD-20	Sensor Ø12mm (FloTap version with screwed process connection and transport spindles) (max. PN40) for steam without end support
FTMD-21	Sensor Ø12mm (FloTap version with screwed process connection and transport spindles) (max. PN40) for steam with end support
2. Pipe (duct) size: (ID/WT):	
DN040	DN 40 / 1-1/2"
DN050	DN 50 / 2"
DN065	DN 65 / 2-1/2"
DN080	DN 80 / 3"
DN100	DN 100 / 4"
Y9	others, please specify
3. Material sensor:	
V	1.4571 / 316Ti
Y	others, please specify
4. Welding coupling:	
000	without
001	material: C22.8 (similar A105)
003	material: 1.4571 / 316Ti
Y9	Special design
5. End support:	
00	without
01	material: C22.8 (similar A105)
03	material: 1.4571 / 316Ti
Y9	Special design
6. Isolation valve for the sensor profile:	
00	without
S01	gate valve PN16/150lbs, mat.: CS, female 1" NPT, packing: graphite
S02	gate valve PN16/150lbs, mat.: 316, female 1" NPT, packing: graphite
S03	gate valve PN40/300lbs, mat.: CS, female 1" NPT, packing: graphite
S04	gate valve PN40/300lbs, mat.: 316, female 1" NPT, packing: graphite
Y9	Special design
7. Flanged packing gland:	
S	material: 1.4571 / 316Ti
Y	Special design
8. Cage nipple:	
PC	material: P235GH (similar A106)
PS	material: 1.4571 / 316Ti
Y9	Special design

Please see next page

Itabar-Flow-Sensors

FTMD-20/-21 / continuation	
Code	Description
9. Packing material for the flanged and welded packing gland:	
2	packing material: graphite, max. 400°C
Y9	Special design
10. Gear / material of gearbox:	
0	without
1	with gear / die-cast aluminium
2	with gear / stainless steel
Y	Special design
11. Pipe insulation:	
KI	without
X	insulation in mm (min. 50mm)
Y	Special design
12. Pipe run/flow direction:	
HL	horizontal, left
HR	horizontal, right
VD	vertical, down
VU	vertical, upwards
Y9	Special design
13. Integrated temperature sensor:	
T0	without
TA	3-wire, RTD -50 bis 400°C, without Ex approval, Sensor diameter=Ø0.5mm
TB	3-wire, RTD -50 bis 400°C, with Ex approval, Sensor diameter=Ø0.5mm
TC	thermocouple type K with INT5334-A3B non-ex-version; 4...20 mA output
TX	sensor prepared for PT100, probe diameter = Ø0.5mm (customer provision)
Y	Special design
13.1 Head transmitter for integrated RTD:	
0	without
2	4...20 mA / without Ex approval
3	4...20 mA + HART / without Ex approval
4	Profibus PA / without Ex approval
5	Foundation Fieldbus / without Ex approval
6	4...20 mA / ATEX Ex ia
7	4...20 mA + HART / ATEX Ex ia
8	Profibus PA / ATEX Ex ia
9	Foundation Fieldbus / ATEX Ex ia
Y	Special design
14. Condensate vessels:	
A00	without
K1H	flanged cond.pots; Ø88,9x5mm; mat.:P265GH; PN100 (600#) (rem. version)
W1H	welded cond.pots; Ø88,9x5mm; mat.:P265GH; PN100 (600#) (rem. version)
K1S	flanged cond.pots; Ø88,9x5mm; mat.:316Ti (1.4571); 600# (PN100) (rem. version)
F1S	welded cond.pots; Ø88,9x5mm; mat.:316Ti (1.4571); 600# (PN100) (rem. version)
A1H	welded cond.pots; Ø88,9x5mm; mat.:heavy boiler plate(HII);600#(PN100)(comp.version)
A1S	welded cond.pots; Ø88,9x5mm; mat.:316Ti (1.4571); 600# (PN100) (comp. version)
Y99	others, please specify

Please see next page

FTMD-20/-21 / continuation	
Code	Description
15. Differential pressure connection:	
A03	1 pair of nozzles, MNPT1/2" (remote version)
AS2	1 pair welding connection Ø21.3x3,2mm - welding end (remote version)
AS3	1 pair welding connection Ø21.3x6,3mm - welding end (remote version)
AS4	1 pair welding connection Ø24x4,0mm - welding end (remote version)
A06	IEC 61518; PTFE gasket
A16	IEC 61518; Viton gasket
Y99	Special design
16. Shut-off valve for remote version (initial shut-off):	
A00	without
A62	1 pair valve, PN400, housing: SS316/316L, female 1/2" NPT, packing: Graphite
A81	1 pair gate valve 800lbs. housing: A105, female 1/2" NPT, packing: Graphite
A82	1 pair gate valve 800lbs. housing: 316SS, female 1/2" NPT, packing: Graphite
AV1	1 pair valve, PN400, housing: C22.8 (A105), Ø21,3x6,3/Ø14,0x2,5 , packing: Graphite
AV2	1 pair valve, PN400, housing: 1.4571 (316Ti), Ø21,3x6,3/Ø14,0x2,5 , packing: Graphite
Y99	Special design
16.1 First Shut-off accessories:	
0	without
E12	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø12mm, mat.: 316SS
E14	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø14mm, mat.: 316SS
Y99	Special design
16.2 Manifold for remote version:	
0	without
A65P	3-way-manifold, 316/316L, PN420 DN5, In/Out: 1/2"-NPTF/IEC61518-A, packing: PTFE
A70P	5-way-manifold, 316/316L PN420 DN5, In/Out: 1/2"-NPTF/IEC61518-A, packing: PTFE
Y99	Special design
16.2.1 Mounting set for remote version (manifold):	
0	without
MBC	mounting set, CS zinc-plated, for 2" pipe mounting, incl. screws 7/16-UNF/ FPM90-O-Ring
MBS	mounting set, stainless steel, for 2" pipe mounting, incl. screws 7/16-UNF/ FPM90-O-Ring
Y99	Special design
16.2.2 Accessories for manifold:	
0	without
E12	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø12mm, mat.: 316SS
E14	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø14mm, mat.: 316SS
Y99	Special design
17. Valve block for compact version:	
A000	without
A66M	3-way-manifold, IEC 61518, material: 1.4404 (316L), packing: PTFE, screws M10
A66U	3-way-manifold, IEC 61518, material: 1.4404 (316L), packing: PTFE, screws 7/16-UNF
A71M	5-way-manifold, IEC 61518, material: 1.4404 (316L), packing: PTFE, screws M10
A71U	5-way-manifold, IEC 61518, material: 1.4404 (316L), packing: PTFE, screws 7/16-UNF
Y999	others, please specify
17. Valve block for compact version:	
0	without
M01	mounting of dp transmitter (customer provision)
M03	mounting of p transmitter (customer provision) with oval flange, mat. st.st.
A4	cleaned from oil+grease certificate
A5	oxygen service certificate
A6	PWIS free certificate (PWIS = paint-wetting impairment substances)
Y99	others, please specify

Itabar-Flow-Sensors

d2) FTMD-25/26

ITABAR®-FLOW-SENSOR for Steam, threaded connection.	
Code	Description
1. Type:	
FTMD-25	Sensor Ø25,4mm (FloTap version with screwed process connection and transport spindles) (max. PN40) for steam without end support
FTMD-26	Sensor Ø25,4mm (FloTap version with screwed process connection and transport spindles) (max. PN40) for steam with end support
2. Pipe (duct) size: (ID/WT):	
DN100	DN 100 / 4"
DN125	DN 125 / 5"
DN150	DN 150 / 6"
DN200	DN 200 / 8"
DN250	DN 250 / 10"
DN300	DN 300 / 12"
DN350	DN 350 / 14"
DN400	DN 400 / 16"
DN450	DN 450 / 18"
DN500	DN 500 / 20"
DN600	DN 600 / 24"
DN700	DN 700 / 28"
DN800	DN 800 / 32"
DN900	DN 900 / 36"
DN1000	DN 1000 / 40"
DN1100	DN 1100 / 44"
DN1200	DN 1200 / 48"
Y9	others, please specify
3. Material sensor:	
S	1.4404 / 316L
V	1.4571 / 316Ti
Y	others, please specify
4. Welding coupling:	
000	without
001	material: C22.8 (similar A105)
002	material: 1.4404 / 316L
003	material: 1.4571 / 316Ti
Y9	Special design
5. End support:	
00	without
01	material: C22.8 (similar A105)
02	material: 1.4404 / 316L
03	material: 1.4571 / 316Ti
Y9	Special design
6. Isolation valve for the sensor profile:	
00	without
S05	gate valve PN16/150lbs, mat.: CS, female 1-1/2" NPT, packing: graphite
S06	gate valve PN16/150lbs, mat.: 316, female 1-1/2" NPT, packing: graphite
S07	gate valve PN40/300lbs, mat.: CS, female 1-1/2" NPT, packing: graphite
S08	gate valve PN40/300lbs, mat.: 316, female 1-1/2" NPT, packing: graphite
Y9	Special design

Please see next page

FTMD-25/-26 / continuation	
Code	Description
7. Flanged packing gland:	
S	1.4404 / 316L
V	1.4571 / 316Ti
Y9	Special design
8. Flanged packing gland:	
PC	material: P235GH (similar A106)
PS	material: 1.4571 / 316Ti
Y9	Special design
9. Packing material for the flanged and welded packing gland:	
2	packing material: graphite, max. 400°C
Y9	Special design
10. Gear / material of gearbox:	
0	without
1	with gear / die-cast aluminium
2	with gear / stainless steel
Y	Special design
11. Pipe insulation:	
KI	without
X	insulation in mm (min. 50mm)
Y	Special design
12. Pipe run/flow direction:	
HL	horizontal, left
HR	horizontal, right
VD	vertical, down
VU	vertical, upwards
Y9	Special design
13. Integrated temperature sensor:	
T0	without
TA	3-wire, RTD -50 bis 400°C, without Ex approval, Sensor diameter=Ø3.0mm
TB	3-wire, RTD -50 bis 400°C, with Ex approval, Sensor diameter= Ø3.0mm
TC	thermocouple type K with INT5334-A3B non-ex-version; 4...20 mA output
TX	sensor prepared for PT100, probe diameter = Ø3.0mm (customer provision)
Y	Special design
13.1 Head transmitter for integrated RTD:	
0	without
2	4...20 mA / without Ex approval
3	4...20 mA + HART / without Ex approval
4	Profibus PA / without Ex approval
5	Foundation Fieldbus / without Ex approval
6	4...20 mA / ATEX Ex ia
7	4...20 mA + HART / ATEX Ex ia
8	Profibus PA / ATEX Ex ia
9	Foundation Fieldbus / ATEX Ex ia
Y	Special design
14. Condensate vessels:	
A00	without
K1H	flanged cond.pots; Ø88,9x5mm; mat.:P265GH; PN100 (600#) (rem. version)
W1H	welded cond.pots; Ø88,9x5mm; mat.:P265GH; PN100 (600#) (rem. version)
K1S	flanged cond.pots; Ø88,9x5mm; mat.:316Ti (1.4571); 600# (PN100) (rem. version)
F1S	welded cond.pots; Ø88,9x5mm; mat.:316Ti (1.4571); 600# (PN100) (rem. version)
A1H	welded cond.pots; Ø88,9x5mm; mat.:heavy boiler plate(HII);600#(PN100)(comp.version)
A1S	welded cond.pots; Ø88,9x5mm; mat.:316Ti (1.4571); 600# (PN100) (comp. version)
Y99	others, please specify

Please see next page

Itabar-Flow-Sensors

FTMD-25/-26 / continuation	
Code	Description
14. Condensate vessels:	
A00	without
K1H	flanged cond.pots; Ø88,9x5mm; mat.:P265GH; PN100 (600#) (rem. version)
W1H	welded cond.pots; Ø88,9x5mm; mat.:P265GH; PN100 (600#) (rem. version)
K1S	flanged cond.pots; Ø88,9x5mm; mat.:316Ti (1.4571); 600# (PN100) (rem. version)
F1S	welded cond.pots; Ø88,9x5mm; mat.:316Ti (1.4571); 600# (PN100) (rem. version)
A1H	welded cond.pots; Ø88,9x5mm; mat.:heavy boiler plate(HII);600#(PN100)(comp.version)
A1S	welded cond.pots; Ø88,9x5mm; mat.:316Ti (1.4571); 600# (PN100) (comp. version)
Y99	others, please specify
15. Differential pressure connection:	
A03	1 pair of nozzles, MNPT1/2" (remote version)
AS2	1 pair welding connection Ø21.3x3,2mm - welding end (remote version)
AS3	1 pair welding connection Ø21.3x6,3mm - welding end (remote version)
AS4	1 pair welding connection Ø24x4,0mm - welding end (remote version)
A06	IEC 61518; PTFE gasket
A16	IEC 61518; Viton gasket
Y99	Special design
16. Shut-off valve for remote version (initial shut-off):	
A00	without
A62	1 pair valve, PN400, housing: SS316/316L, female 1/2" NPT, packing: Graphite
A81	1 pair gate valve 800lbs. housing: A105, female 1/2" NPT, packing: Graphite
A82	1 pair gate valve 800lbs. housing: 316SS, female 1/2" NPT, packing: Graphite
AV1	1 pair valve, PN400, housing: C22.8 (A105), Ø21,3x6,3/Ø14,0x2,5 , packing: Graphite
AV2	1 pair valve, PN400, housing: 1.4571 (316Ti), Ø21,3x6,3/Ø14,0x2,5 , packing: Graphite
Y99	Special design
16.1 First Shut-off accessories:	
0	without
E12	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø12mm, mat.: 316SS
E14	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø14mm, mat.: 316SS
Y99	Special design
16.2 Manifold for remote version:	
0	without
A65P	3-way-manifold, 316/316L, PN420 DN5, In/Out: 1/2"-NPTF/IEC61518-A, packing: PTFE
A70P	5-way-manifold, 316/316L PN420 DN5, In/Out: 1/2"-NPTF/IEC61518-A, packing: PTFE
Y99	Special design
16.2.1 Mounting set for remote version (manifold):	
0	without
MBC	mounting set, CS zinc-plated, for 2" pipe mounting, incl. screws 7/16-UNF/ FPM90-O-Ring
MBS	mounting set, stainless steel, for 2" pipe mounting, incl. screws 7/16-UNF/ FPM90-O-Ring
Y99	Special design
16.2.2 Accessories for manifold:	
0	without
E12	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø12mm, mat.: 316SS
E14	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø14mm, mat.: 316SS
Y99	Special design

Please see next page

FTMD-25/-26 / continuation	
Code	Description
17. Valve block for compact version:	
A000	without
A66M	3-way-manifold, IEC 61518, material: 1.4404 (316L), packing: PTFE, screws M10
A66U	3-way-manifold, IEC 61518, material: 1.4404 (316L), packing: PTFE, screws 7/16-UNF
A71M	5-way-manifold, IEC 61518, material: 1.4404 (316L), packing: PTFE, screws M10
A71U	5-way-manifold, IEC 61518, material: 1.4404 (316L), packing: PTFE, screws 7/16-UNF
Y999	others, please specify
17. Valve block for compact version:	
0	without
M01	mounting of dp transmitter (customer provision)
M03	mounting of p transmitter (customer provision) with oval flange, mat. st.st.
A4	cleaned from oil+grease certificate
A5	oxygen service certificate
A6	PWIS free certificate (PWIS = paint-wetting impairment substances)
Y99	others, please specify

Itabar-Flow-Sensors

d3) FTMD-35/36

ITABAR®-FLOW-SENSOR for Steam, flanged connection.	
Code	Description
1. Type:	
FTMD-35	Sensor Ø42mm (FloTap version with screwed process connection and transport spindles) (max. PN40) for steam without end support
FTMD-36	Sensor Ø42mm (FloTap version with screwed process connection and transport spindles) (max. PN40) for steam with end support
2. Pipe (duct) size: (ID/WT):	
DN100	DN 100 / 4"
DN125	DN 125 / 5"
DN150	DN 150 / 6"
DN200	DN 200 / 8"
DN250	DN 250 / 10"
DN300	DN 300 / 12"
DN350	DN 350 / 14"
DN400	DN 400 / 16"
DN450	DN 450 / 18"
DN500	DN 500 / 20"
DN600	DN 600 / 24"
DN700	DN 700 / 28"
DN800	DN 800 / 32"
DN900	DN 900 / 36"
DN1000	DN 1000 / 40"
DN1100	DN 1100 / 44"
DN1200	DN 1200 / 48"
Y9	others, please specify
3. Material sensor:	
S	1.4404 / 316L
V	1.4571 / 316Ti
Y	others, please specify
4. Welding coupling:	
000	without
001	material: C22.8 (similar A105)
002	material: 1.4404 / 316L
003	material: 1.4571 / 316Ti
Y9	Special design
5. End support:	
00	without
01	material: C22.8 (similar A105)
02	material: 1.4404 / 316L
03	material: 1.4571 / 316Ti
Y9	Special design
6. Isolation valve for the sensor profile:	
00	without
S09	gate valve PN16/150lbs, mat.: CS, female 2" NPT, packing: graphite
S10	gate valve PN16/150lbs, mat.: 316, female 2" NPT, packing: graphite
S11	gate valve PN40/300lbs, mat.: CS, female 2" NPT, packing: graphite
S12	gate valve PN40/300lbs, mat.: 316, female 2" NPT, packing: graphite
Y9	Special design

Please see next page

FTMD-35/-36 / continuation	
Code	Description
7. Flanged packing gland:	
S	1.4404 / 316L
V	1.4571 / 316Ti
Y9	Special design
8. Cage nipple:	
PC	material: P235GH (similar A106)
PS	material: 1.4571 / 316Ti
Y9	Special design
9. Packing material for the flanged and welded packing gland:	
2	packing material: graphite, max. 400°C
Y9	Special design
10. Gear / material of gearbox:	
0	without
1	with gear / die-cast aluminium
2	with gear / stainless steel
Y	Special design
11. Pipe insulation:	
KI	without
X	insulation in mm (min. 50mm)
Y	Special design
12. Pipe run/flow direction:	
HL	horizontal, left
HR	horizontal, right
VD	vertical, down
VU	vertical, upwards
Y9	Special design
13. Integrated temperature sensor:	
T0	without
TA	3-wire, RTD -50 bis 400°C, without Ex approval, Sensor diameter=Ø3.0mm
TB	3-wire, RTD -50 bis 400°C, with Ex approval, Sensor diameter= Ø3.0mm
TC	thermocouple type K with INT5334-A3B non-ex-version; 4...20 mA output
TX	sensor prepared for PT100, probe diameter = Ø3.0mm (customer provision)
Y	Special design
13.1 Head transmitter for integrated RTD:	
0	without
2	4...20 mA / without Ex approval
3	4...20 mA + HART / without Ex approval
4	Profibus PA / without Ex approval
5	Foundation Fieldbus / without Ex approval
6	4...20 mA / ATEX Ex ia
7	4...20 mA + HART / ATEX Ex ia
8	Profibus PA / ATEX Ex ia
9	Foundation Fieldbus / ATEX Ex ia
Y	Special design
14. Condensate vessels:	
A00	without
K1H	flanged cond.pots; Ø88,9x5mm; mat.:P265GH; PN100 (600#) (rem. version)
W1H	welded cond.pots; Ø88,9x5mm; mat.:P265GH; PN100 (600#) (rem. version)
K1S	flanged cond.pots; Ø88,9x5mm; mat.:316Ti (1.4571); 600# (PN100) (rem. version)
F1S	welded cond.pots; Ø88,9x5mm; mat.:316Ti (1.4571); 600# (PN100) (rem. version)
A1H	welded cond.pots; Ø88,9x5mm; mat.:heavy boiler plate(HII);600#(PN100)(comp.version)
A1S	welded cond.pots; Ø88,9x5mm; mat.:316Ti (1.4571); 600# (PN100) (comp. version)
Y99	others, please specify

Please see next page

Itabar-Flow-Sensors

FTMD-35/-36 / continuation	
Code	Description
14. Condensate vessels:	
A00	without
K1H	flanged cond.pots; Ø88,9x5mm; mat.:P265GH; PN100 (600#) (rem. version)
W1H	welded cond.pots; Ø88,9x5mm; mat.:P265GH; PN100 (600#) (rem. version)
K1S	flanged cond.pots; Ø88,9x5mm; mat.:316Ti (1.4571); 600# (PN100) (rem. version)
F1S	welded cond.pots; Ø88,9x5mm; mat.:316Ti (1.4571); 600# (PN100) (rem. version)
A1H	welded cond.pots; Ø88,9x5mm; mat.:heavy boiler plate(HII);600#(PN100)(comp.version)
A1S	welded cond.pots; Ø88,9x5mm; mat.:316Ti (1.4571); 600# (PN100) (comp. version)
Y99	others, please specify
15. Differential pressure connection:	
A03	1 pair of nozzles, MNPT1/2" (remote version)
AS2	1 pair welding connection Ø21.3x3,2mm - welding end (remote version)
AS3	1 pair welding connection Ø21.3x6,3mm - welding end (remote version)
AS4	1 pair welding connection Ø24x4,0mm - welding end (remote version)
A06	IEC 61518; PTFE gasket
A16	IEC 61518; Viton gasket
Y99	Special design
16. Shut-off valve for remote version (initial shut-off):	
A00	without
A62	1 pair valve, PN400, housing: SS316/316L, female 1/2" NPT, packing: Graphite
A81	1 pair gate valve 800lbs. housing: A105, female 1/2" NPT, packing: Graphite
A82	1 pair gate valve 800lbs. housing: 316SS, female 1/2" NPT, packing: Graphite
AV1	1 pair valve, PN400, housing: C22.8 (A105), Ø21,3x6,3/Ø14,0x2,5 , packing: Graphite
AV2	1 pair valve, PN400, housing: 1.4571 (316Ti), Ø21,3x6,3/Ø14,0x2,5 , packing: Graphite
Y99	Special design
16.1 First Shut-off accessories:	
0	without
E12	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø12mm, mat.: 316SS
E14	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø14mm, mat.: 316SS
Y99	Special design
16.2 Manifold for remote version:	
0	without
A65P	3-way-manifold, 316/316L, PN420 DN5, In/Out: 1/2"-NPTF/IEC61518-A, packing: PTFE
A70P	5-way-manifold, 316/316L PN420 DN5, In/Out: 1/2"-NPTF/IEC61518-A, packing: PTFE
Y99	Special design
16.2.1 Mounting set for remote version (manifold):	
0	without
MBC	mounting set, CS zinc-plated, for 2" pipe mounting, incl. screws 7/16-UNF/ FPM90-O-Ring
MBS	mounting set, stainless steel, for 2" pipe mounting, incl. screws 7/16-UNF/ FPM90-O-Ring
Y99	Special design
16.2.2 Accessories for manifold:	
0	without
E12	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø12mm, mat.: 316SS
E14	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø14mm, mat.: 316SS
Y99	Special design

Please see next page

FTMD-35/-36 / continuation	
Code	Description
17. Valve block for compact version:	
A000	without
A66M	3-way-manifold, IEC 61518, material: 1.4404 (316L), packing: PTFE, screws M10
A66U	3-way-manifold, IEC 61518, material: 1.4404 (316L), packing: PTFE, screws 7/16-UNF
A71M	5-way-manifold, IEC 61518, material: 1.4404 (316L), packing: PTFE, screws M10
A71U	5-way-manifold, IEC 61518, material: 1.4404 (316L), packing: PTFE, screws 7/16-UNF
Y999	others, please specify
17. Valve block for compact version:	
0	without
M01	mounting of dp transmitter (customer provision)
M03	mounting of p transmitter (customer provision) with oval flange, mat. st.st.
A4	cleaned from oil+grease certificate
A5	oxygen service certificate
A6	PWIS free certificate (PWIS = paint-wetting impairment substances)
Y99	others, please specify

FT*D

C.3 Itabar for Steam (Flo Tap-Version))

FTHD

C.3.2 Flo-Tap-Version (Installation under Pressure)

Flo-Tap-Version with Flanged Process Connection and Guide-Rod-Spindles Types: FTHD-20/21/25/26/35/36 (up to 588 psi [PN 40])

a) Description

The ITABAR-sensor series FTHD is designed to measure volumetric flow of saturated and super heated steam. The sensor construction features a flanged connection between the pipe and the sensor-related parts, a compression fitting to seal the sensor and a gate valve to insert the sensor profile into the pipe. The sensor can be used at an operating pressure of up to 588 psi (40 bar) and an operating temperature of up to 752 °F (400°C). The insertion or removal of the sensor is made easy by two guide-rod spindles or (as an option) via a hand wheel driven gearbox.

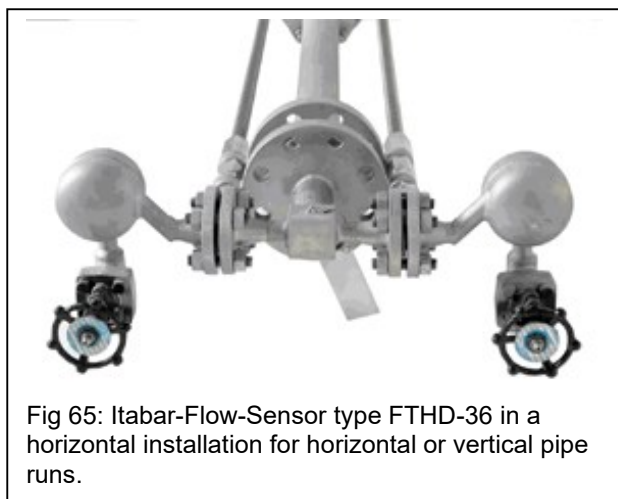
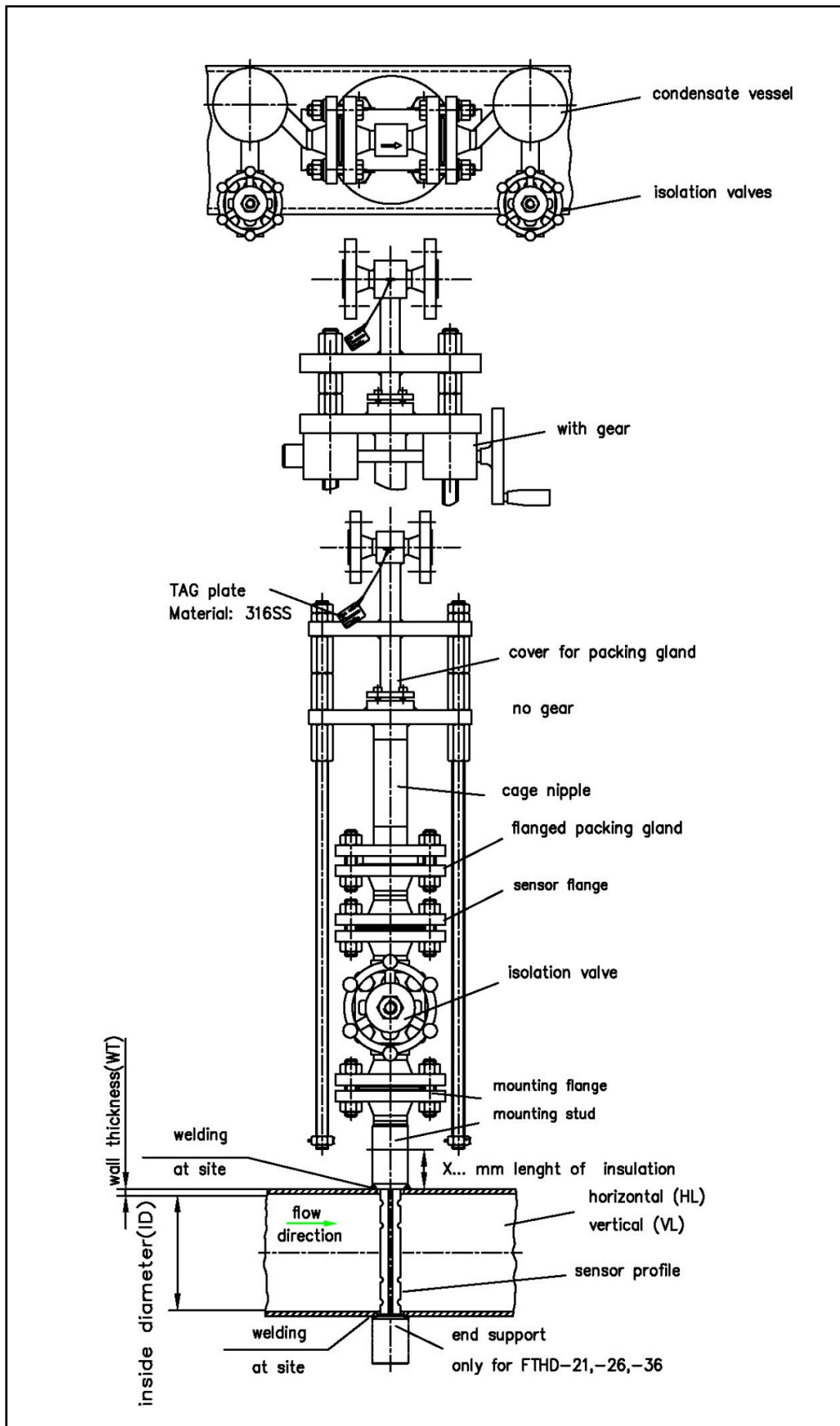


Fig 65: Itabar-Flow-Sensor type FTHD-36 in a horizontal installation for horizontal or vertical pipe runs.



Fig 66: Itabar-Flow-Sensor type FTHD-36 made of stainless steel for a pipe with ID = 336.5 mm

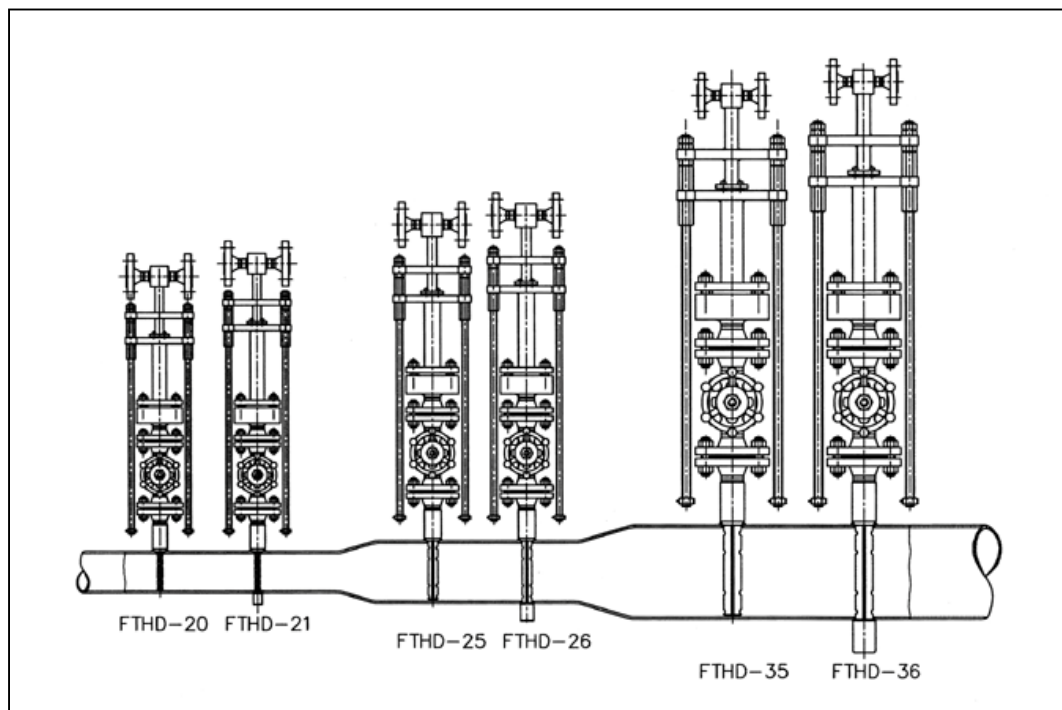
b) Drawing for FTHD



Itabar-Flow-Sensors

c.) Order Data for Itabar® Series FTHD-20/21/25/26/35/36

c.1) Sensor type:



Pipe Size DN	Pipe Size (inches)	Maximum allowable volumetric flow in m³/h					
		Sensor type					
		FTHD -20	FTHD -21	FTHD -25	FTHD -26	FTHD -35	FTHD -36
DN 40	1 1/2	40	114	---	---	---	---
DN 50	2	59	161	---	---	---	---
DN 65	2 1/4	93	243	---	---	---	---
DN 80	3	130	328	---	---	---	---
DN 100	4	179	439	205	544	---	---
DN 125	5	238	570	281	719	---	---
DN 150	6	---	---	358	894	---	---
DN 200	8	---	---	515	1242	---	---
DN 250	10	---	---	687	1623	---	---
DN 300	12	---	---	872	2034	1757	4204
DN 350	14	---	---	1053	2433	2142	5067
DN 400	16	---	---	1226	2828	2532	5938
DN 500	20	---	---	1592	3627	3283	7611
DN 600	24	---	---	1949	4423	4052	9327
DN 700	28	---	---	2318	5237	4851	11106
DN 800	32	---	---	2704	6099	5667	12930
DN 900	36	---	---	---	7000	---	14790
DN 1000	40	---	---	---	7921	---	16614
DN 1200	48	---	---	---	9763	---	20450
DN1400	56	---	---	---	11569	---	24220
1600	64	---	---	---	13315	---	27987
1800	72	---	---	---	15040	---	31613
2000	80	---	---	---	---	---	---

These values are for water of $\rho = 0,9982 \text{ kg/l}$ SGU and at a temperature $T = 20 \text{ }^{\circ}\text{C}$. To calculate volumetric or mass flow of fluids with other densities see chapter 6 „Specifications of DP Sensors with WINFLOW“.

d) Order Specifications Itabar-Flow Sensors Series FTHD

d1) FTHD-20/21

ITABAR®-FLOW-SENSOR for Steam, flanged connection.	
Code	Description
1. Type:	
FTHD-20	Sensor Ø12mm (FloTap version with flanged process connection and transport spindles) (max. PN100) for steam without end support
FTHD-21	Sensor Ø12mm (FloTap version with flanged process connection and transport spindles) (max. PN100) for steam with end support
2. Pipe (duct) size: (ID/WT):	
DN040	DN 40 / 1-1/2"
DN050	DN 50 / 2"
DN065	DN 65 / 2-1/2"
DN080	DN 80 / 3"
DN100	DN 100 / 4"
Y9	others, please specify
3. Material sensor:	
S	1.4404 / 316L
V	1.4571 / 316Ti
Y	others, please specify
4. Process connection:	
00	without
FA	flanged connection
Y	Special design
4.1 standard:	
E	EN 1092-1
A	ASME B 16.5
D	DIN (according to type & pressure rating)
Y	Special design
4.2 nominal size:	
A23	DN25
AGG	1"
Y9	Special design
4.3 Pressure class:	
C	PN16
D	PN40
E	PN63
F	PN100
K	150 lbs.
L	300 lbs.
M	600 lbs.
Y9	Special design

Please see next page

Itabar-Flow-Sensors

FTHD-20/-21 / continuation	
Code	Description
4.4 Flange face process connection flange:	
E0	EN 1092-1 Form A (without sealing strip; Ra 3.2-12.5µm)
E1	EN 1092-1 Form B1 (raised sealing strip; Ra 3,2-12,5µm)
E2	EN 1092-1 Form B2 (raised sealing strip; Ra 0,8-3,2µm)
E3	EN 1092-1 Form C (tongue; Ra 0,8-3,2µm)
E4	EN 1092-1 Form D (groove; Ra 0,8-3,2µm)
A1	ASME B 16.5 Raised Face (RF)
A2	ASME B 16.5 Raised Face Smooth Finish (RFSF)
A3	ASME B 16.5 Flat Face (FF)
A4	ASME B 16.5 Ring-Type Joint (RTJ)
A5	ASME B 16.5 Tongue (ASME)
A6	ASME B 16.5 Groove (ASME)
D1	DIN Form A (without special demand)
D2	DIN Form B (raised sealing strip ; Rz = 160µm)
D3	DIN Form C (raised sealing strip ; Rz = 160µm)
D4	DIN Form D (raised sealing strip ; Rz = 40µm)
D5	DIN Form E (raised sealing strip ; Rz = 16µm)
D6	DIN Form F (tongue acc. DIN 2512)
D7	DIN Form N (groove acc. DIN 2512)
Y9	Special design
4.5 Gasket:	
0	w/out
B	Fibre-reinforced flat gasket; Klingersil C4400, thickness: 2 mm; max. 200°C (392°F)
C	Sp.wd. gasket w/ IR(316)&AR(CS) flng graph.; thickn.: 4.5 mm; max. 450°C (842°F)
D	Sp.wd. gasket w/ IR(316SS)&AR(316SS) flng graph.;thickn.:4.5mm;max.450°C (842°F)
RO	Ring-Joint Seal Type R-Oval ASME B16.20
Y9	Special design
4.6 Bolts / nuts:	
0	without
1	DIN931 (ISO 4014) hex-head screw with one nut; material: 5.6/5.2 (C.S. zinc-plated)
2	DIN931 (ISO 4014) hex-head screw with one nut; material: A2-70 (stainless steel)
3	DIN 2510 Form L Material: 1.1181 / CK35
4	DIN 2510 Form L Material: 1.4301 / A2-70
5	ASME B16.5 Material: A193 Gr. B7 / A194 Gr. 2H (galvanised)
6	ASME B16.5 Material: A193 Gr. B8 Cl.1 / A194 Gr. 8
Y9	others, please specify
5. Design mounting part:	
0	without (provided by others / customer /)
R	mounting stud with flange (standard)
W0	weldolet assembly, stud with flange
Y9	others, please specify

Please see next page

FTHD-20/-21 / continuation	
Code	Description
5.1 Material mounting stud:	
C	P250GH / A105
S	1.4404 / 316L
V	1.4571 / 316Ti
Y99	Special design
5.2 standard:	
E	EN 1092-1
A	ASME B 16.5
D	DIN (according to type & pressure rating)
Y	Special design
5.3 nominal size:	
A23	DN25
AGG	1"
Y9	Special design
5.4 Pressure class:	
C	PN16
D	PN40
E	PN63
F	PN100
K	150 lbs.
L	300 lbs.
M	600 lbs.
Y9	Special design
5.5 Flange face mounting stud flange:	
E0	EN 1092-1 Form A (without sealing strip; Ra 3.2-12.5µm)
E1	EN 1092-1 Form B1 (raised sealing strip; Ra 3,2-12,5µm)
E2	EN 1092-1 Form B2 (raised sealing strip; Ra 0,8-3,2µm)
E3	EN 1092-1 Form C (tongue; Ra 0,8-3,2µm)
E4	EN 1092-1 Form D (groove; Ra 0,8-3,2µm)
A1	ASME B 16.5 Raised Face (RF)
A2	ASME B 16.5 Raised Face Smooth Finish (RFSF)
A3	ASME B 16.5 Flat Face (FF)
A4	ASME B 16.5 Ring-Type Joint (RTJ)
A5	ASME B 16.5 Tongue (ASME)
A6	ASME B 16.5 Groove (ASME)
D1	DIN Form A (without special demand)
D2	DIN Form B (raised sealing strip ; Rz = 160µm)
D3	DIN Form C (raised sealing strip ; Rz = 160µm)
D4	DIN Form D (raised sealing strip ; Rz = 40µm)
D5	DIN Form E (raised sealing strip ; Rz = 16µm)
D6	DIN Form F (tongue acc. DIN 2512)
D7	DIN Form N (groove acc. DIN 2512)
Y9	others, please specify

Please see next page

Itabar-Flow-Sensors

FTHD-20/-21 / continuation	
Code	Description
6. End support:	
0	without
C	material: C22.8 (similar A105)
S	material: 1.4404 / 316L
V	material: 1.4571 / 316Ti
Y	Special design
7. Isolation valve for the sensor profile (Flange face as mounting stud flange):	
00	without
MF01	ball valve flanged DN25 PN16, mat.: C.S., packing: PTFE
MF02	ball valve flanged DN25 PN16, mat.: CF8M (1.4408), packing: PTFE
MF03	ball valve flanged DN25 PN40, mat.: C.S., packing: PTFE
MF04	ball valve flanged DN25 PN40, mat.: CF8M (1.4408), packing: PTFE
MS01	gate valve flanged DN25 PN100, mat.: C.S., packing: Graphite
MS02	gate valve flanged DN25 PN100, mat.: stainless steel, packing: Graphite
AF01	ball valve flanged 1" ANSI 150 lbs, mat.: C.S., packing: PTFE
AF02	ball valve flanged 1" ANSI 150 lbs, mat.: CF8M (1.4408), packing: PTFE
AF03	ball valve flanged 1" ANSI 300 lbs, mat.: C.S., packing: PTFE
AF04	ball valve flanged 1" ANSI 300 lbs, mat.: CF8M (1.4408), packing: PTFE
AS01	gate valve flanged 1" ANSI 600 lbs, mat.: C.S., packing: Graphite
AS02	gate valve flanged 1" ANSI 600 lbs, mat.: stainless steel, packing: Graphite
Y99	Special design
8. Flanged packing gland:	
S	material: 1.4404 / 316L
V	material: 1.4571 / 316Ti
Y	others, please specify
9. Cage nipple:	
PC	material: P235GH (similar A106)
PS	material: 1.4404 / 316L
PV	material: 1.4571 / 316Ti
Y9	others, please specify
10. Packing material for the flanged and welded packing gland:	
2	packing material: graphite, max. 400°C
Y9	Special design
11. Gear / material of gearbox:	
0	without
1	with gear / die-cast aluminium
2	with gear / stainless steel
Y	Special design
12. Pipe insulation:	
KI	without
X	insulation in mm (min. 50mm)
Y	others, please specify

Please see next page

FTHD-20/-21 / continuation	
Code	Description
13. Pipe run/flow direction:	
HL	horizontal, left
HR	horizontal, right
VD	vertical, down
VU	vertical, upwards
Y9	Special design
14. integr. Temperature sensor:	
T0	without
TA	3-wire, RTD -50 bis 400°C, without Ex approval, Sensor diameter=Ø0.5mm
TB	3-wire, RTD -50 bis 400°C, with Ex approval, Sensor diameter=Ø0.5mm
TC	thermocouple type K with INT5334-A3B non-ex-version; 4...20 mA output
TX	sensor prepared for PT100, probe diameter = Ø0.5mm (customer provision)
Y	Special design
14.1 Head transmitter for integrated RTD:	
0	without
2	4...20 mA / without Ex approval
3	4...20 mA + HART / without Ex approval
4	Profibus PA / without Ex approval
5	Foundation Fieldbus / without Ex approval
6	4...20 mA / ATEX Ex ia
7	4...20 mA + HART / ATEX Ex ia
8	Profibus PA / ATEX Ex ia
9	Foundation Fieldbus / ATEX Ex ia
Y	Special design
15. Condensate vessels:	
A00	without
K1H	flanged cond. pots; Ø88,9x5mm; mat.: P265GH; PN100 (600#) (rem. vers.)
W1H	welded cond. pots; Ø88,9x5mm; mat.: P265GH; PN100 (600#) (rem. vers.)
K1S	flanged cond. pots; Ø88,9x5mm; mat.: 316Ti (1.4571); 600# (PN100) (rem. vers.)
F1S	welded cond. pots; Ø88,9x5mm; mat.: 316Ti (1.4571); 600# (PN100) (rem. vers.)
A1H	welded cond. pots; Ø88,9x5mm; mat.: heavy boiler plate (HII); 600# (PN100) (comp. vers.)
A1S	welded cond. pots; Ø88,9x5mm; mat.: 316Ti (1.4571); 600# (PN100) (comp. vers.)
Y99	Special design
16. Differential pressure connection:	
A03	1 pair of nozzles, MNPT 1/2" (remote version)
AS2	1 pair welding connection Ø21.3x3,2mm - welding end (remote version)
AS3	1 pair welding connection Ø21.3x6,3mm - welding end (remote version)
AS4	1 pair welding connection Ø24x4,0mm - welding end (remote version)
A06	IEC 61518; PTFE gasket
A16	IEC 61518; Viton gasket
Y99	others, please specify
17. Shut-off valve for remote version (initial shut-off):	
A00	without
A62	1 pair valve, PN400, housing: SS316/316L, female 1/2" NPT, packing: Graphite
A81	1 pair gate valve 800lbs. housing: A105, female 1/2" NPT, packing: Graphite
A82	1 pair gate valve 800lbs. housing: 316SS, female 1/2" NPT, packing: Graphite
AV1	1 pair valve, PN400, housing: C22.8 (A105), Ø21,3x6,3/Ø14,0x2,5, packing: Graphite
AV2	1 pair valve, PN400, housing: 1.4571 (316Ti), Ø21,3x6,3/Ø14,0x2,5, packing: Graphite
Y99	others, please specify

Please see next page

Itabar-Flow-Sensors

FTHD-20/-21 / continuation	
Code	Description
17.1 First Shut-off accessories:	
0	without
E12	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø12mm, mat.: 316SS
E14	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø14mm, mat.: 316SS
Y99	others, please specify
17.2 Manifold for remote version:	
0	without
A65P	3-way-manifold, 316/316L, PN420 DN5, In/Out: 1/2"-NPTF/IEC61518-A, packing: PTFE
A70P	5-way-manifold, 316/316L PN420 DN5, In/Out: 1/2"-NPTF/IEC61518-A, packing: PTFE
Y99	others, please specify
17.2.1 Mounting set for remote version (manifold):	
0	without
MBC	mounting set, CS zinc-plated, for 2" pipe mounting, incl. screws 7/16-UNF/ FPM90-O-Ring
MBS	mounting set, stainless steel, for 2" pipe mounting, incl. screws 7/16-UNF/ FPM90-O-Ring
Y99	others, please specify
17.2.2 Accessories for manifold:	
0	without
E12	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø12mm, mat.: 316SS
E14	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø14mm, mat.: 316SS
Y99	others, please specify
18. Valve block for compact version:	
A000	without
A66M	3-way-manifold, IEC 61518, material: 1.4404 (316L), packing: PTFE, screws M10
A66U	3-way-manifold, IEC 61518, material: 1.4404 (316L), packing: PTFE, screws 7/16-UNF
A71M	5-way-manifold, IEC 61518, material: 1.4404 (316L), packing: PTFE, screws M10
A71U	5-way-manifold, IEC 61518, material: 1.4404 (316L), packing: PTFE, screws 7/16-UNF
Y999	others, please specify
19. Special design/pre-assembly:	
0	without
M01	mounting of dp transmitter (customer provision)
M03	mounting of p transmitter (customer provision) with oval flange, mat. st.st.
A4	cleaned from oil+grease certificate
A5	oxygen service certificate
A6	PWIS free certificate (PWIS = paint-wetting impairment substances)
Y99	others, please specify

d2) FTHD-25/26

ITABAR®-FLOW-SENSOR for Steam, flanged connection.	
Code	Description
1. Type:	
FTHD-25	Sensor Ø25.4mm (FloTap version with flanged process connection and transport spindles) (max. PN100) for steam without end support
FTHD-26	Sensor Ø25.4mm (FloTap version with flanged process connection and transport spindles) (max. PN100) for steam with end support
2. Pipe (duct) size: (ID/WT):	
DN100	DN 100 / 4"
DN125	DN 125 / 5"
DN150	DN 150 / 6"
DN200	DN 200 / 8"
DN250	DN 250 / 10"
DN300	DN 300 / 12"
DN350	DN 350 / 14"
DN400	DN 400 / 16"
DN450	DN 450 / 18"
DN500	DN 500 / 20"
DN600	DN 600 / 24"
DN700	DN 700 / 28"
DN800	DN 800 / 32"
DN900	DN 900 / 36"
DN1000	DN 1000 / 40"
Y9	others, please specify
3. Material sensor:	
S	1.4404 / 316L
V	1.4571 / 316Ti
Y	others, please specify
4. Process connection:	
00	without
FA	flanged connection
Y	Special design
4.1 standard:	
E	EN 1092-1
A	ASME B 16.5
D	DIN (according to type & pressure rating)
Y	Special design
4.2 nominal size:	
32	DN32
40	DN40
12	1-1/2"
Y9	Special design
4.3 Pressure class:	
C	PN16
D	PN40
E	PN63
F	PN100
K	150 lbs.
L	300 lbs.
M	600 lbs.
Y9	Special design

Please see next page

Itabar-Flow-Sensors

FTHD-25/-26 / continuation	
Code	Description
4.4 Flange face process connection flange:	
E0	EN 1092-1 Form A (without sealing strip; Ra 3.2-12.5µm)
E1	EN 1092-1 Form B1 (raised sealing strip; Ra 3,2-12,5µm)
E2	EN 1092-1 Form B2 (raised sealing strip; Ra 0,8-3,2µm)
E3	EN 1092-1 Form C (tongue; Ra 0,8-3,2µm)
E4	EN 1092-1 Form D (groove; Ra 0,8-3,2µm)
A1	ASME B 16.5 Raised Face (RF)
A2	ASME B 16.5 Raised Face Smooth Finish (RFSF)
A3	ASME B 16.5 Flat Face (FF)
A4	ASME B 16.5 Ring-Type Joint (RTJ)
A5	ASME B 16.5 Tongue (ASME)
A6	ASME B 16.5 Groove (ASME)
D1	DIN Form A (without special demand)
D2	DIN Form B (raised sealing strip ; Rz = 160µm)
D3	DIN Form C (raised sealing strip ; Rz = 160µm)
D4	DIN Form D (raised sealing strip ; Rz = 40µm)
D5	DIN Form E (raised sealing strip ; Rz = 16µm)
D6	DIN Form F (tongue acc. DIN 2512)
D7	DIN Form N (groove acc. DIN 2512)
Y9	Special design
4.5 Gasket:	
0	w/out
B	Fibre-reinforced flat gasket; Klingsil C4400, thickness: 2 mm; max. 200°C (392°F)
C	Sp.wd. gasket w/ IR(316)&AR(CS) flng graph.; thckn.: 4.5 mm; max. 450°C (842°F)
D	Sp.wd. gasket w/ IR(316SS)&AR(316SS) flng graph.;thckn.:4.5mm;max.450°C (842°F)
RO	Ring-Joint Seal Type R-Oval ASME B16.20
Y9	Special design
4.6 Bolts / nuts:	
0	without
1	DIN931 (ISO 4014) hex-head screw with one nut; material: 5.6/5.2 (C.S. zinc-plated)
2	DIN931 (ISO 4014) hex-head screw with one nut; material: A2-70 (stainless steel)
3	DIN 2510 Form L Material: 1.1181 / CK35
4	DIN 2510 Form L Material: 1.4301 / A2-70
5	ASME B16.5 Material: A193 Gr. B7 / A194 Gr. 2H (galvanised)
6	ASME B16.5 Material: A193 Gr. B8 Cl.1 / A194 Gr. 8
Y9	others, please specify
5. Design mounting part:	
0	without (provided by others / customer /)
R	mounting stud with flange (standard)
W0	weldolet assembly, stud with flange
Y9	others, please specify

Please see next page

FTHD-25/-26 / continuation	
Code	Description
5.1 Material mounting stud:	
C	P250GH / A105
S	1.4404 / 316L
V	1.4571 / 316Ti
Y99	Special design
5.2 standard:	
E	EN 1092-1
A	ASME B 16.5
D	DIN (according to type & pressure rating)
Y	Special design
5.3 nominal size:	
32	DN32
40	DN40
12	1-1/2"
Y9	Special design
5.4 Pressure class:	
C	PN16
D	PN40
E	PN63
F	PN100
K	150 lbs.
L	300 lbs.
M	600 lbs.
Y9	Special design
5.5 Flange face mounting stud flange:	
E0	EN 1092-1 Form A (without sealing strip; Ra 3.2-12.5µm)
E1	EN 1092-1 Form B1 (raised sealing strip; Ra 3,2-12,5µm)
E2	EN 1092-1 Form B2 (raised sealing strip; Ra 0,8-3,2µm)
E3	EN 1092-1 Form C (tongue; Ra 0,8-3,2µm)
E4	EN 1092-1 Form D (groove; Ra 0,8-3,2µm)
A1	ASME B 16.5 Raised Face (RF)
A2	ASME B 16.5 Raised Face Smooth Finish (RFSF)
A3	ASME B 16.5 Flat Face (FF)
A4	ASME B 16.5 Ring-Type Joint (RTJ)
A5	ASME B 16.5 Tongue (ASME)
A6	ASME B 16.5 Groove (ASME)
D1	DIN Form A (without special demand)
D2	DIN Form B (raised sealing strip ; Rz = 160µm)
D3	DIN Form C (raised sealing strip ; Rz = 160µm)
D4	DIN Form D (raised sealing strip ; Rz = 40µm)
D5	DIN Form E (raised sealing strip ; Rz = 16µm)
D6	DIN Form F (tongue acc. DIN 2512)
D7	DIN Form N (groove acc. DIN 2512)
Y9	others, please specify

Please see next page

Itabar-Flow-Sensors

FTHD-25/-26 / continuation	
Code	Description
6. End support:	
0	without
C	material: C22.8 (similar A105)
S	material: 1.4404 / 316L
V	material: 1.4571 / 316Ti
Y	Special design
7. Isolation valve for the sensor profile (Flange face as mounting stud flange):	
00	without
MF10	ball valve flanged DN32 PN16, mat.: C.S., packing: PTFE
MF11	ball valve flanged DN32 PN16, mat.: CF8M (1.4408), packing: PTFE
MF15	ball valve flanged DN32 PN40, mat.: C.S., packing: PTFE
MF16	ball valve flanged DN32 PN40, mat.: CF8M (1.4408), packing: PTFE
MF22	ball valve flanged DN40 PN63, mat.: C.S., packing: PTFE
MF23	ball valve flanged DN40 PN63, mat.: CF8M (1.4408), packing: PTFE
MS10	gate valve flanged DN40 PN100, mat.: C.S., packing: Graphite
MS11	gate valve flanged DN40 PN100, mat.: stainless steel, packing: Graphite
AF10	ball valve flanged 1-1/2" ANSI 150 lbs, mat.: C.S., packing: PTFE
AF11	ball valve flanged 1-1/2" ANSI 150 lbs, mat.: CF8M (1.4408), packing: PTFE
AF15	ball valve flanged 1-1/2" ANSI 300 lbs, mat.: C.S., packing: PTFE
AF16	ball valve flanged 1-1/2" ANSI 300 lbs, mat.: CF8M (1.4408), packing: PTFE
AS10	gate valve flanged 1-1/2" ANSI 600 lbs, mat.: C.S., packing: Graphite
AS11	gate valve flanged 1-1/2" ANSI 600 lbs, mat.: stainless steel, packing: Graphite
Y99	others, please specify
8. Flanged packing gland:	
S	material: 1.4404 / 316L
V	material: 1.4571 / 316Ti
Y	others, please specify
9. Cage nipple:	
PC	material: P235GH (similar A106)
PS	material: 1.4404 / 316L
PV	material: 1.4571 / 316Ti
Y9	others, please specify
10. Packing material for the flanged and welded packing gland:	
2	packing material: graphite, max. 400°C
Y9	Special design
11. Gear / material of gearbox:	
0	without
1	with gear / die-cast aluminium
2	with gear / stainless steel
Y	Special design
12. Pipe insulation:	
KI	without
X	insulation in mm (min. 50mm)
Y	others, please specify

Please see next page

FTHD-25/-26 / continuation	
Code	Description
13. Pipe run/flow direction:	
HL	horizontal, left
HR	horizontal, right
VD	vertical, down
VU	vertical, upwards
Y9	Special design
14. integr. Temperature sensor:	
T0	without
TA	3-wire, RTD -50 bis 400°C, without Ex approval, Sensor diameter=Ø0.5mm
TB	3-wire, RTD -50 bis 400°C, with Ex approval, Sensor diameter=Ø0.5mm
TC	thermocouple type K with INT5334-A3B non-ex-version; 4...20 mA output
TX	sensor prepared for PT100, probe diameter = Ø0.5mm (customer provision)
Y	Special design
14.1 Head transmitter for integrated RTD:	
0	without
2	4...20 mA / without Ex approval
3	4...20 mA + HART / without Ex approval
4	Profibus PA / without Ex approval
5	Foundation Fieldbus / without Ex approval
6	4...20 mA / ATEX Ex ia
7	4...20 mA + HART / ATEX Ex ia
8	Profibus PA / ATEX Ex ia
9	Foundation Fieldbus / ATEX Ex ia
Y	Special design
15. Condensate vessels:	
A00	without
K1H	flanged cond. pots; Ø88,9x5mm; mat.: P265GH; PN100 (600#) (rem. vers.)
W1H	welded cond. pots; Ø88,9x5mm; mat.: P265GH; PN100 (600#) (rem. vers.)
K1S	flanged cond. pots; Ø88,9x5mm; mat.: 316Ti (1.4571); 600# (PN100) (rem. vers.)
F1S	welded cond. pots; Ø88,9x5mm; mat.: 316Ti (1.4571); 600# (PN100) (rem. vers.)
A1H	welded cond. pots; Ø88,9x5mm; mat.: heavy boiler plate (HII); 600# (PN100) (comp. vers.)
A1S	welded cond. pots; Ø88,9x5mm; mat.: 316Ti (1.4571); 600# (PN100) (comp. vers.)
Y99	Special design
16. Differential pressure connection:	
A03	1 pair of nozzles, MNPT 1/2" (remote version)
AS2	1 pair welding connection Ø21.3x3,2mm - welding end (remote version)
AS3	1 pair welding connection Ø21.3x6,3mm - welding end (remote version)
AS4	1 pair welding connection Ø24x4,0mm - welding end (remote version)
A06	IEC 61518; PTFE gasket
A16	IEC 61518; Viton gasket
Y99	others, please specify
17. Shut-off valve for remote version (initial shut-off):	
A00	without
A62	1 pair valve, PN400, housing: SS316/316L, female 1/2" NPT, packing: Graphite
A81	1 pair gate valve 800lbs. housing: A105, female 1/2" NPT, packing: Graphite
A82	1 pair gate valve 800lbs. housing: 316SS, female 1/2" NPT, packing: Graphite
AV1	1 pair valve, PN400, housing: C22.8 (A105), Ø21,3x6,3/Ø14,0x2,5, packing: Graphite
AV2	1 pair valve, PN400, housing: 1.4571 (316Ti), Ø21,3x6,3/Ø14,0x2,5, packing: Graphite
Y99	others, please specify

Please see next page

Itabar-Flow-Sensors

FTHD-25/-26 / continuation	
Code	Description
17.1 First Shut-off accessories:	
0	without
E12	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø12mm, mat.: 316SS
E14	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø14mm, mat.: 316SS
Y99	others, please specify
17.2 Manifold for remote version:	
0	without
A65P	3-way-manifold, 316/316L, PN420 DN5, In/Out: 1/2"-NPTF/IEC61518-A, packing: PTFE
A70P	5-way-manifold, 316/316L PN420 DN5, In/Out: 1/2"-NPTF/IEC61518-A, packing: PTFE
Y99	others, please specify
17.2.1 Mounting set for remote version (manifold):	
0	without
MBC	mounting set, CS zinc-plated, for 2" pipe mounting, incl. screws 7/16-UNF/ FPM90-O-Ring
MBS	mounting set, stainless steel, for 2" pipe mounting, incl. screws 7/16-UNF/ FPM90-O-Ring
Y99	others, please specify
17.2.2 Accessories for manifold:	
0	without
E12	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø12mm, mat.: 316SS
E14	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø14mm, mat.: 316SS
Y99	others, please specify
18. Valve block for compact version:	
A000	without
A66M	3-way-manifold, IEC 61518, material: 1.4404 (316L), packing: PTFE, screws M10
A66U	3-way-manifold, IEC 61518, material: 1.4404 (316L), packing: PTFE, screws 7/16-UNF
A71M	5-way-manifold, IEC 61518, material: 1.4404 (316L), packing: PTFE, screws M10
A71U	5-way-manifold, IEC 61518, material: 1.4404 (316L), packing: PTFE, screws 7/16-UNF
Y999	others, please specify
19. Special design/pre-assembly:	
0	without
M01	mounting of dp transmitter (customer provision)
M03	mounting of p transmitter (customer provision) with oval flange, mat. st.st.
A4	cleaned from oil+grease certificate
A5	oxygen service certificate
A6	PWIS free certificate (PWIS = paint-wetting impairment substances)
Y99	others, please specify

d3) FTHD-35/36

ITABAR®-FLOW-SENSOR for Steam, flanged connection.	
Code	Description
1. Type:	
FTHD-35	Sensor Ø42mm (FloTap version with flanged process connection and transport spindles) (max. PN100) for steam without end support
FTHD-36	Sensor Ø42mm (FloTap version with flanged process connection and transport spindles) (max. PN100) for steam with end support
2. Pipe (duct) size: (ID/WT):	
DN300	DN 300 / 12"
DN350	DN 350 / 14"
DN400	DN 400 / 16"
DN450	DN 450 / 18"
DN500	DN 500 / 20"
DN600	DN 600 / 24"
DN700	DN 700 / 28"
DN800	DN 800 / 32"
DN900	DN 900 / 36"
DN1000	DN 1000 / 40"
DN1100	DN 1100 / 44"
DN1200	DN 1200 / 48"
DN1400	DN 1400 / 56"
DN1600	DN 1600 / 64"
DN1800	DN 1800 / 72"
Y9	others, please specify
3. Material sensor:	
S	1.4404 / 316L
V	1.4571 / 316Ti
Y	others, please specify
4. Process connection:	
00	without
FA	flanged connection
Y	Special design
4.1 standard:	
E	EN 1092-1
A	ASME B 16.5
D	DIN (according to type & pressure rating)
Y	Special design
4.2 nominal size:	
50	DN50
20	2"
Y9	Special design
4.3 Pressure class:	
C	PN16
D	PN40
E	PN63
F	PN100
K	150 lbs.
L	300 lbs.
M	600 lbs.
Y9	Special design

Please see next page

Itabar-Flow-Sensors

FTHD-35/-36 / continuation	
Code	Description
4.4 Flange face process connection flange:	
E0	EN 1092-1 Form A (without sealing strip; Ra 3.2-12.5µm)
E1	EN 1092-1 Form B1 (raised sealing strip; Ra 3,2-12,5µm)
E2	EN 1092-1 Form B2 (raised sealing strip; Ra 0,8-3,2µm)
E3	EN 1092-1 Form C (tongue; Ra 0,8-3,2µm)
E4	EN 1092-1 Form D (groove; Ra 0,8-3,2µm)
A1	ASME B 16.5 Raised Face (RF)
A2	ASME B 16.5 Raised Face Smooth Finish (RFSF)
A3	ASME B 16.5 Flat Face (FF)
A4	ASME B 16.5 Ring-Type Joint (RTJ)
A5	ASME B 16.5 Tongue (ASME)
A6	ASME B 16.5 Groove (ASME)
D1	DIN Form A (without special demand)
D2	DIN Form B (raised sealing strip ; Rz = 160µm)
D3	DIN Form C (raised sealing strip ; Rz = 160µm)
D4	DIN Form D (raised sealing strip ; Rz = 40µm)
D5	DIN Form E (raised sealing strip ; Rz = 16µm)
D6	DIN Form F (tongue acc. DIN 2512)
D7	DIN Form N (groove acc. DIN 2512)
Y9	Special design
4.5 Gasket:	
0	w/out
B	Fibre-reinforced flat gasket; Klingsil C4400, thickness: 2 mm; max. 200°C (392°F)
C	Sp.wd. gasket w/ IR(316)&AR(CS) flng graph.; thckn.: 4.5 mm; max. 450°C (842°F)
D	Sp.wd. gasket w/ IR(316SS)&AR(316SS) flng graph.;thckn.:4.5mm;max.450°C (842°F)
RO	Ring-Joint Seal Type R-Oval ASME B16.20
Y9	Special design
4.6 Bolts / nuts:	
0	without
1	DIN931 (ISO 4014) hex-head screw with one nut; material: 5.6/5.2 (C.S. zinc-plated)
2	DIN931 (ISO 4014) hex-head screw with one nut; material: A2-70 (stainless steel)
3	DIN 2510 Form L Material: 1.1181 / CK35
4	DIN 2510 Form L Material: 1.4301 / A2-70
5	ASME B16.5 Material: A193 Gr. B7 / A194 Gr. 2H (galvanised)
6	ASME B16.5 Material: A193 Gr. B8 Cl.1 / A194 Gr. 8
Y9	others, please specify
5. Design mounting part:	
0	without (provided by others / customer /)
R	mounting stud with flange (standard)
W0	weldolet assembly, stud with flange
Y9	others, please specify

Please see next page

FTMD-35/-36 / continuation	
Code	Description
5.1 Material mounting stud:	
C	P250GH / A105
S	1.4404 / 316L
V	1.4571 / 316Ti
Y99	Special design
5.2 standard:	
E	EN 1092-1
A	ASME B 16.5
D	DIN (according to type & pressure rating)
Y	Special design
5.3 nominal size:	
50	DN50
20	2"
Y9	Special design
5.4 Pressure class:	
C	PN16
D	PN40
E	PN63
F	PN100
K	150 lbs.
L	300 lbs.
M	600 lbs.
Y9	Special design
5.5 Flange face mounting stud flange:	
E0	EN 1092-1 Form A (without sealing strip; Ra 3.2-12.5µm)
E1	EN 1092-1 Form B1 (raised sealing strip; Ra 3,2-12,5µm)
E2	EN 1092-1 Form B2 (raised sealing strip; Ra 0,8-3,2µm)
E3	EN 1092-1 Form C (tongue; Ra 0,8-3,2µm)
E4	EN 1092-1 Form D (groove; Ra 0,8-3,2µm)
A1	ASME B 16.5 Raised Face (RF)
A2	ASME B 16.5 Raised Face Smooth Finish (RFSF)
A3	ASME B 16.5 Flat Face (FF)
A4	ASME B 16.5 Ring-Type Joint (RTJ)
A5	ASME B 16.5 Tongue (ASME)
A6	ASME B 16.5 Groove (ASME)
D1	DIN Form A (without special demand)
D2	DIN Form B (raised sealing strip ; Rz = 160µm)
D3	DIN Form C (raised sealing strip ; Rz = 160µm)
D4	DIN Form D (raised sealing strip ; Rz = 40µm)
D5	DIN Form E (raised sealing strip ; Rz = 16µm)
D6	DIN Form F (tongue acc. DIN 2512)
D7	DIN Form N (groove acc. DIN 2512)
Y9	others, please specify

Please see next page

Itabar-Flow-Sensors

FTMD-35/-36 / continuation	
Code	Description
6. End support:	
0	without
C	material: C22.8 (similar A105)
S	material: 1.4404 / 316L
V	material: 1.4571 / 316Ti
Y	Special design
7. Isolation valve for the sensor profile (Flange face as mounting stud flange):	
00	without
MF30	ball valve flanged DN50 PN16, mat.: C.S., packing: PTFE
MF31	ball valve flanged DN50 PN16, mat.: CF8M (1.4408), packing: PTFE
MF35	ball valve flanged DN50 PN40, mat.: C.S., packing: PTFE
MF36	ball valve flanged DN50 PN40, mat.: CF8M (1.4408), packing: PTFE
MF40	ball valve flanged DN50 PN63, mat.: C.S., packing: PTFE
MF41	ball valve flanged DN50 PN63, mat.: CF8M (1.4408), packing: PTFE
MS20	gate valve flanged DN50 PN100, mat.: C.S., packing: Graphite
MS21	gate valve flanged DN50 PN100, mat.: stainless steel, packing: Graphite
AF30	ball valve flanged 2" ANSI 150 lbs, mat.: C.S., packing: PTFE
AF31	ball valve flanged 2" ANSI 150 lbs, mat.: CF8M (1.4408), packing: PTFE
AF35	ball valve flanged 2" ANSI 300 lbs, mat.: C.S., packing: PTFE
AF36	ball valve flanged 2" ANSI 300 lbs, mat.: CF8M (1.4408), packing: PTFE
AS20	gate valve flanged 2" ANSI 600 lbs, mat.: C.S., packing: Graphite
AS21	gate valve flanged 2" ANSI 600 lbs, mat.: stainless steel, packing: Graphite
Y99	others, please specify
8. Flanged packing gland:	
S	material: 1.4404 / 316L
V	material: 1.4571 / 316Ti
X	material: 1.4462 / ASTM F51 / Duplex
K	material: 1.4539 / AISI 904L
M	material: 2.4360 / Alloy 400 / N04400
H	material: 2.4610 / Alloy C4 / N06455
I	material: 2.4858 / Alloy 825 / N08825
Y	others, please specify
9. Cage nipple:	
PC	material: P235GH (similar A106)
PS	material: 1.4404 / 316L
PV	material: 1.4571 / 316Ti
Y9	others, please specify
10. Packing material for the flanged and welded packing gland:	
2	packing material: graphite, max. 400°C
Y9	Special design
11. Gear / material of gearbox:	
0	without
1	with gear / die-cast aluminium
2	with gear / stainless steel
Y	Special design
12. Pipe insulation:	
KI	without
X	insulation in mm (min. 50mm)
Y	others, please specify

Please see next page

FTMD-35/-36 / continuation	
Code	Description
13. Pipe run/flow direction:	
HL	horizontal, left
HR	horizontal, right
VD	vertical, down
VU	vertical, upwards
Y9	Special design
14. integr. Temperature sensor:	
T0	without
TA	3-wire, RTD -50 bis 400°C, without Ex approval, Sensor diameter=Ø0.5mm
TB	3-wire, RTD -50 bis 400°C, with Ex approval, Sensor diameter=Ø0.5mm
TC	thermocouple type K with INT5334-A3B non-ex-version; 4...20 mA output
TX	sensor prepared for PT100, probe diameter = Ø0.5mm (customer provision)
Y	Special design
14.1 Head transmitter for integrated RTD:	
0	without
2	4...20 mA / without Ex approval
3	4...20 mA + HART / without Ex approval
4	Profibus PA / without Ex approval
5	Foundation Fieldbus / without Ex approval
6	4...20 mA / ATEX Ex ia
7	4...20 mA + HART / ATEX Ex ia
8	Profibus PA / ATEX Ex ia
9	Foundation Fieldbus / ATEX Ex ia
Y	Special design
15. Condensate vessels:	
A00	without
K1H	flanged cond. pots; Ø88,9x5mm; mat.: P265GH; PN100 (600#) (rem. vers.)
W1H	welded cond. pots; Ø88,9x5mm; mat.: P265GH; PN100 (600#) (rem. vers.)
K1S	flanged cond. pots; Ø88,9x5mm; mat.: 316Ti (1.4571); 600# (PN100) (rem. vers.)
F1S	welded cond. pots; Ø88,9x5mm; mat.: 316Ti (1.4571); 600# (PN100) (rem. vers.)
A1H	welded cond. pots; Ø88,9x5mm; mat.: heavy boiler plate (HII); 600# (PN100) (comp. vers.)
A1S	welded cond. pots; Ø88,9x5mm; mat.: 316Ti (1.4571); 600# (PN100) (comp. vers.)
Y99	Special design
16. Differential pressure connection:	
A03	1 pair of nozzles, MNPT 1/2" (remote version)
AS2	1 pair welding connection Ø21.3x3,2mm - welding end (remote version)
AS3	1 pair welding connection Ø21.3x6,3mm - welding end (remote version)
AS4	1 pair welding connection Ø24x4,0mm - welding end (remote version)
A06	IEC 61518; PTFE gasket
A16	IEC 61518; Viton gasket
Y99	others, please specify
17. Shut-off valve for remote version (initial shut-off):	
A00	without
A62	1 pair valve, PN400, housing: SS316/316L, female 1/2" NPT, packing: Graphite
A81	1 pair gate valve 800lbs. housing: A105, female 1/2" NPT, packing: Graphite
A82	1 pair gate valve 800lbs. housing: 316SS, female 1/2" NPT, packing: Graphite
AV1	1 pair valve, PN400, housing: C22.8 (A105), Ø21,3x6,3/Ø14,0x2,5, packing: Graphite
AV2	1 pair valve, PN400, housing: 1.4571 (316Ti), Ø21,3x6,3/Ø14,0x2,5, packing: Graphite
Y99	others, please specify

Please see next page

Itabar-Flow-Sensors

FTMD-35/-36 / continuation	
Code	Description
17.1 First Shut-off accessories:	
0	without
E12	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø12mm, mat.: 316SS
E14	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø14mm, mat.: 316SS
Y99	others, please specify
17.2 Manifold for remote version:	
0	without
A65P	3-way-manifold, 316/316L, PN420 DN5, In/Out: 1/2"-NPTF/IEC61518-A, packing: PTFE
A70P	5-way-manifold, 316/316L PN420 DN5, In/Out: 1/2"-NPTF/IEC61518-A, packing: PTFE
Y99	others, please specify
17.2.1 Mounting set for remote version (manifold):	
0	without
MBC	mounting set, CS zinc-plated, for 2" pipe mounting, incl. screws 7/16-UNF/ FPM90-O-Ring
MBS	mounting set, stainless steel, for 2" pipe mounting, incl. screws 7/16-UNF/ FPM90-O-Ring
Y99	others, please specify
17.2.2 Accessories for manifold:	
0	without
E12	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø12mm, mat.: 316SS
E14	1 pair Ermeto-screw joints 1/2" NPT-M auf Ø14mm, mat.: 316SS
Y99	others, please specify
18. Valve block for compact version:	
A000	without
A66M	3-way-manifold, IEC 61518, material: 1.4404 (316L), packing: PTFE, screws M10
A66U	3-way-manifold, IEC 61518, material: 1.4404 (316L), packing: PTFE, screws 7/16-UNF
A71M	5-way-manifold, IEC 61518, material: 1.4404 (316L), packing: PTFE, screws M10
A71U	5-way-manifold, IEC 61518, material: 1.4404 (316L), packing: PTFE, screws 7/16-UNF
Y999	others, please specify
19. Special design/pre-assembly:	
0	without
M01	mounting of dp transmitter (customer provision)
M03	mounting of p transmitter (customer provision) with oval flange, mat. st.st.
A4	cleaned from oil+grease certificate
A5	oxygen service certificate
A6	PWIS free certificate (PWIS = paint-wetting impairment substances)
Y99	others, please specify

D Appendices

D.1 Selected Application Examples

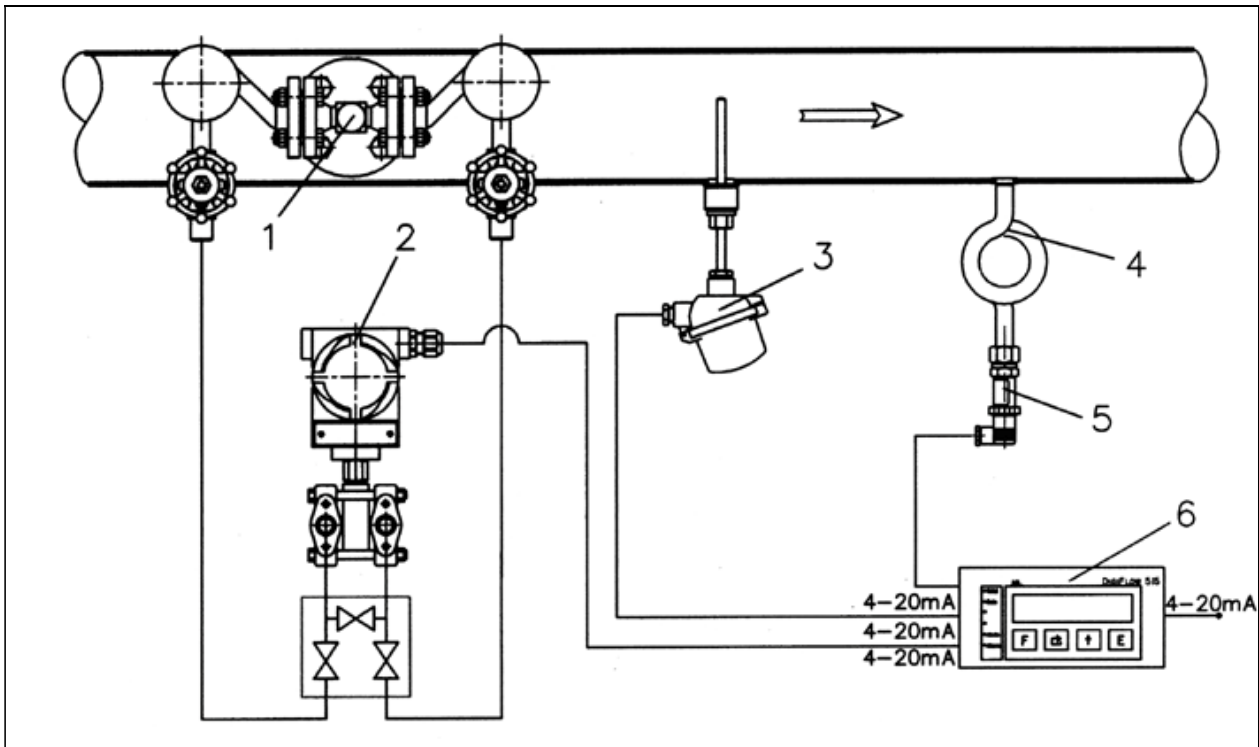


Fig. 67: Mass flow and heat measurement of steam with DP sensor type IBRD-26 (1), DP transmitter (2), PT100 temperature sensor (3) with integrated signal converter, contained (4) protected pressure sensor (5) and flow computer (6) type DigiFlow 515.

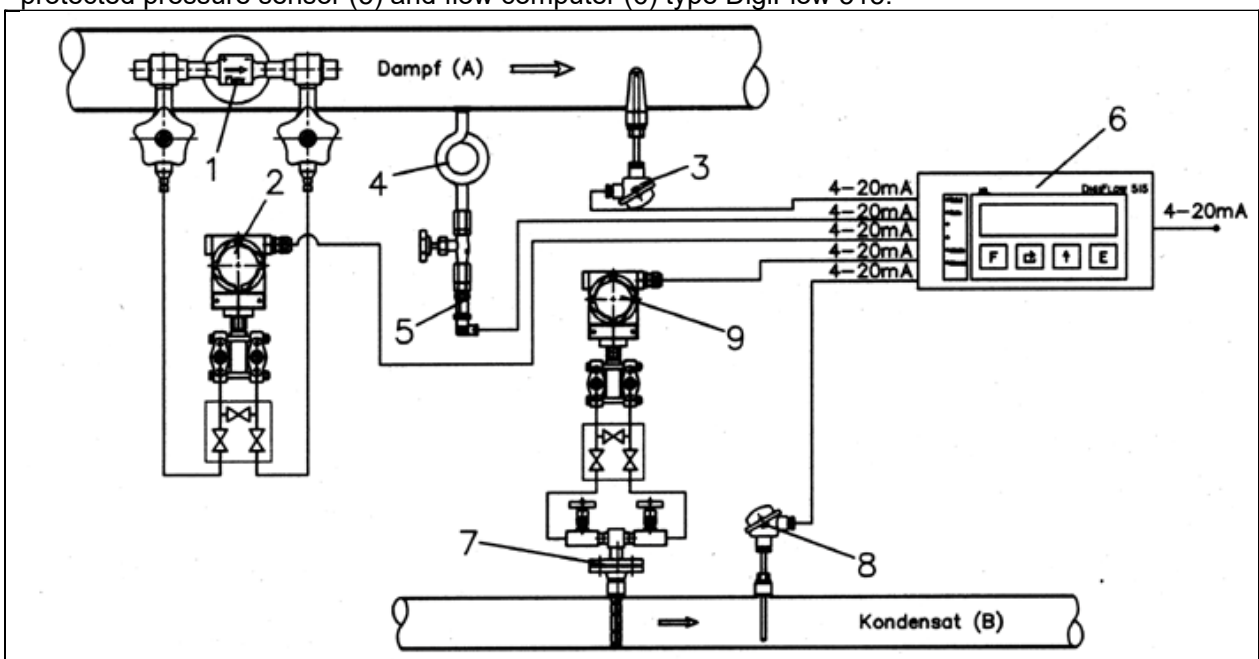


Fig. 68: Measurement of expended heat by calculating difference between heat in steam (A) and condensate (B). Components : DP sensor type IBFD-26 (1), DP transmitter (2 and 9), PT100 temperature sensor (3 and 8) with integrated signal converter, water loop (4), pressure sensor (5), DP sensor type IBF-25 (7) and flow computer (6) type DigiFlow 515.

Itabar-Flow-Sensors

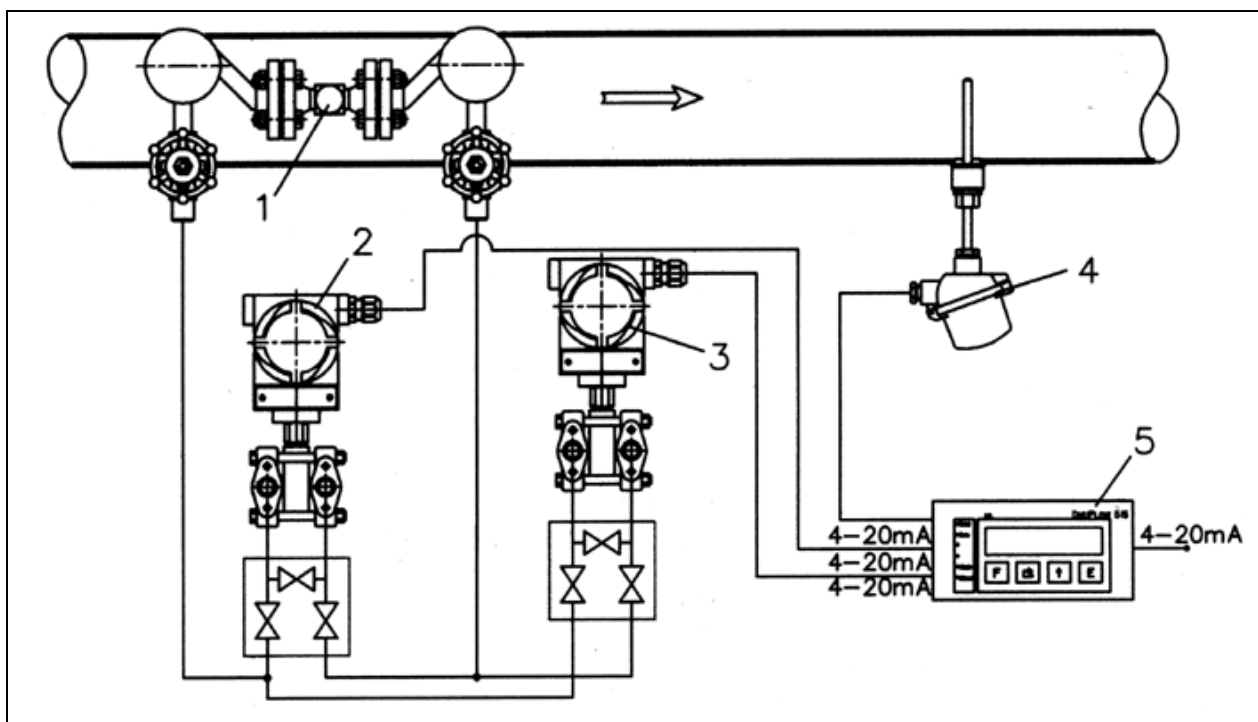


Fig. 69: Mass flow measurement of steam with expanded measuring range. The DP flow signal from sensor IBRD-26 (1) is the input to two separate DP transmitters (2 and 3) with different range settings (split range). Other components : PT100 temperature sensor (4) with integrated signal converter and flow computer type DigiFlow 515 (5).

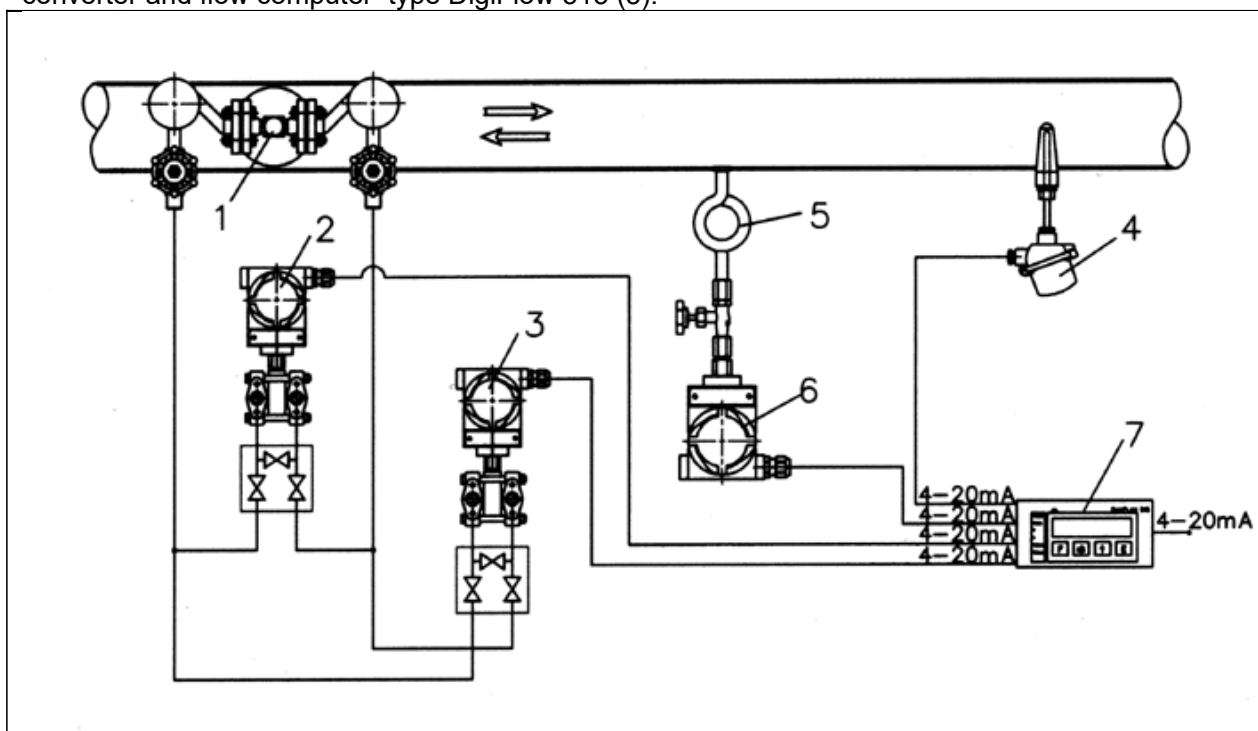


Fig. 70: Bi-directional mass flow measurement of steam with increased accuracy. Components: DP flow sensor type IBRD-25 (1), DP transmitter for forward flow (2) and reverse flow (3), PT100 temperature sensor with integrated signal converter (4), water loop (5), pressure sensor (6) and flow calculator (7) type DigiFlow 515.

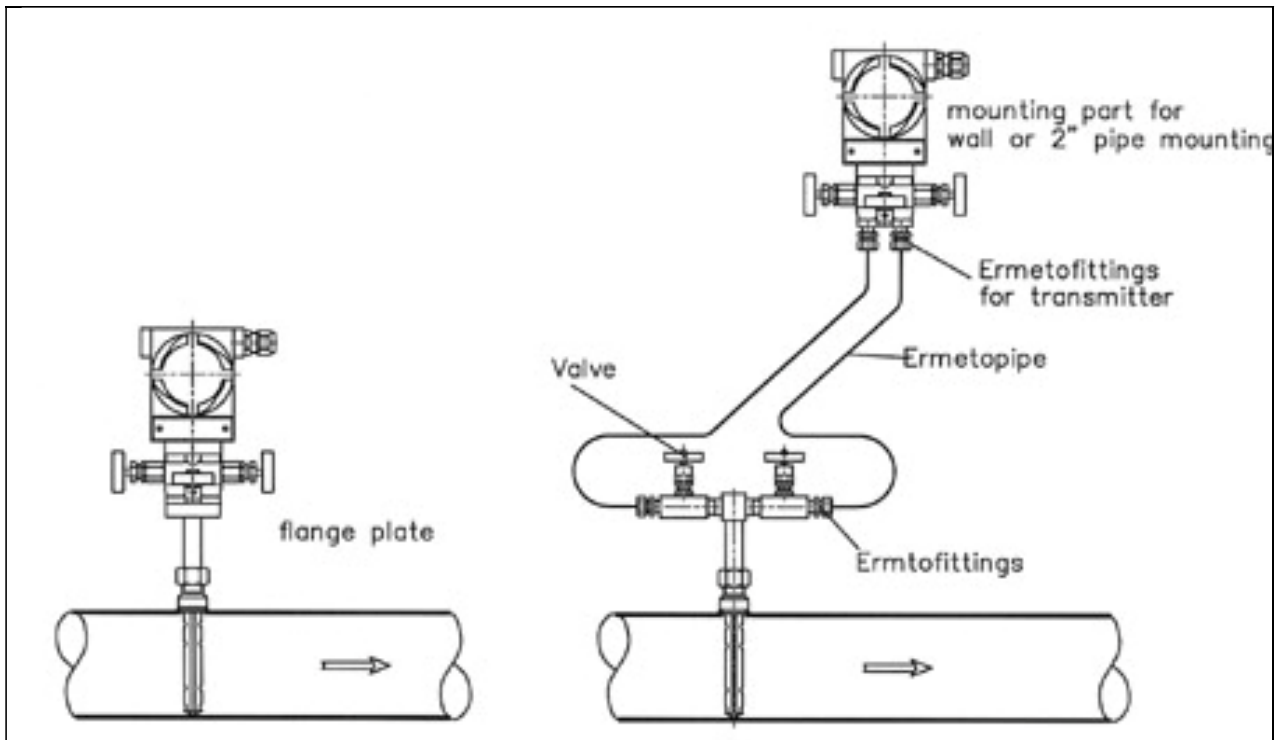


Fig 71: The temperature limits of compact sensors (w/integrally mounted DP transmitter) are given by the temperature limits T_{FL} of the transmitter's process connections (as listed by the manufacturer). It is necessary to calculate in each instance whether or not the maximum allowable temperature at the transmitter's process connection might be exceeded or not. Such calculations are a function of a number of variables, requiring case by case computations for reliable results.

If the operating temperature of the fluid far exceeds the specified transmitter temperature limits it is recommended to install heat or cold insulation layers or – as a further step – to increase the distance between transmitter flange plate and sensor pipe mounting.

The following example for the use of a compact version sensor (w/integral transmitter) illustrates the issue (see Fig 66): The differential pressure is measured by a standard DP transmitter with a maximum allowed temperature of $T_{FL} = 85^\circ\text{C}$ at the process flanges.

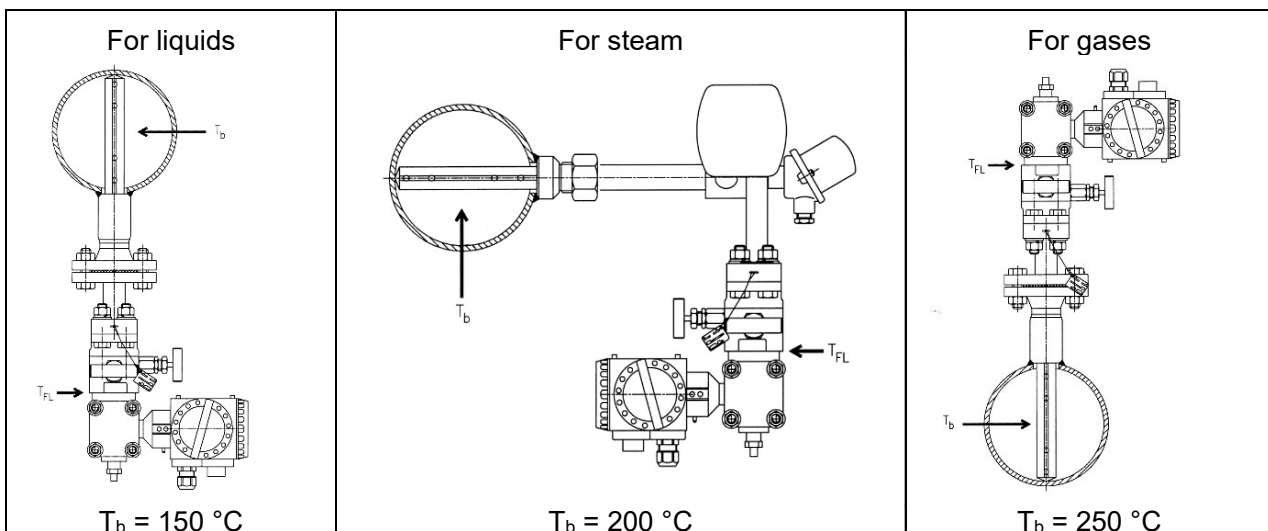


Fig 72: Maximum allowable operating temperature T_b and recommended installation for compact version DP flow sensors: For liquids (steam, gases) the maximum allowable temperature $T_b = 150^\circ\text{C}$ (200°C , 250°C). Experience shows that with these temperature limits the specified max temperature of $T_{FL} = 85^\circ\text{C}$ at the process flanges will not be exceeded.

D.2 Pressure ratings acc. DIN & ANSI

DIN	ANSI	@ 20 °C
PN 16		max. 16 bar
	150 lbs	max. 20 bar
PN 40		max. 40 bar
	300 lbs	max. 50 bar
PN 64		max. 64 bar
PN 100		max. 100 bar
	600 lbs	max. 110 bar
	900 lbs	max. 150 bar
PN 160		max. 160 bar
PN 250		max. 250 bar
	1500 lbs	max. 260 bar
PN 320		max. 320 bar
PN 400		max. 400 bar
	2500 lbs	max. 420 bar

D.3 Engineering Units Conversion Tables

D.3.1 Pressure Units

In commerce and governmental business the older pressure units - at, atü, ata, kg/cm², kp/cm², atm, mmWS, kp/m², Torr, mmHG, mmQS - are only allowed for exports. The new pressure unit is PASCAL [Pa] = Newton per sqare meter [N/m²]. Because this unit is not very handy „Bar“ is used as a multiple.

Pa N / m²	kPa	MPa	bar	mbar	inch H₂O	inch HG	PSI lpf/in²
1	10 ⁻³	10 ⁻⁶	10 ⁻⁵	10 ⁻²	4,016·10 ⁻³	2,953·10 ⁻⁴	145,05·10 ⁻⁶
10 ³	1	10 ⁻³	10 ⁻²	10	4,016	0,2953	0,14505
10 ⁶	10 ³	1	10	10 ⁴	4016	295,3	145,05
10 ⁵	100	0,1	1	10 ³	401,6	29,53	14,505
100	0,1	10 ⁻⁴	10 ⁻³	1	0,4016	29,53·10 ⁻³	14,505·10 ⁻³
249,1	0,2491	0,2491·10 ⁻³	2,491·10 ⁻³	2,491	1	7,355·10 ⁻²	36,126·10 ⁻³
3386	3,386	3,386·10 ⁻³	3,386·10 ⁻²	33,86	13,6	1	0,4912
6894,8	6,8948	6,8948·10 ⁻³	6,8948·10 ⁻²	68,948	27,68	2,036	1

Pressure conversion tables for older units :

Pa N / m²	kPa	bar	mbar	mmWS mmH₂O	Torr mmHg	at kp / cm²	atm
1	10 ⁻³	10 ⁻⁵	10 ⁻²	0,102	7,501·10 ⁻³	10,2·10 ⁻⁶	9,869·10 ⁻⁶
10 ³	1	10 ⁻²	10	102	7,501	10,2·10 ⁻³	9,869·10 ⁻³
10 ⁶	10 ³	10	10 ⁴	102·10 ³	7501	10,2	9,869
10 ⁵	100	1	10 ³	10,2·10 ³	750,1	1,02	0,9869
100	0,1	10 ⁻³	1	10,2	0,7501	1,02·10 ⁻³	0,9869·10 ⁻³
9807	9,807	98,07·10 ⁻³	98,07	10 ³	73,56	0,1	96,78·10 ⁻³
9,807	9,807·10 ⁻³	98,07·10 ⁻⁶	98,07·10 ⁻³	1	73,56·10 ⁻³	10 ⁻⁴	96,78·10 ⁻⁶
133,32	0,13332	1,333·10 ⁻³	1,333	13,59	1	1,359·10 ⁻³	1,316·10 ⁻³
98,07·10 ³	98,07	0,9807	980,7	10 ⁴	735,6	1	0,9678
1,013·10 ⁵	101,3	1,013	1013	10,33·10 ³	760	1,033	1

D.3.2 Viscosity Units

There are two types of viscosity : dynamic viscosity and kinematic viscosity .

Dynamic viscosity is independent of fluid density. The SI unit for dynamic viscosity is the Pascal-second [Pa·s]. A dynamic viscosity of one Pascal-second is equal to the dynamic viscosity of a laminar flowing homogenous fluid, in which the tension between two in parallel flowing streams with an in-between distance of 1 meter and at a velocity difference of 1 m/s is 1 Pascal. Older units for dynamic viscosity are Poise [P] or [kp s/m²].

Conversion Table for Dynamic Viscosity Units

Pa s	mPa s cP	dPa s P	kp s / m²	kp h / m²	lb-mass/ ft s	lb-force s
1	1000	10	0,10197	$2,833 \times 10^{-5}$	0,6721	$2,0885 \times 10^{-2}$
0,001	1	0,01	$0,10197 \times 10^{-3}$	$2,833 \times 10^{-8}$	$0,6721 \times 10^{-3}$	$2,0885 \times 10^{-5}$
0,1	100	1	0,010197	$2,833 \times 10^{-6}$	0,06721	$2,0885 \times 10^{-3}$
9,807	9807	98,07	1	$2,778 \times 10^{-4}$	6,5919	$0,2048 \times 10^{-1}$
$0,35304 \times 10^5$	$0,35304 \times 10^8$	$0,35304 \times 10^6$	3600	1	$2,3730 \times 10^4$	$0,73728 \times 10^3$
1,488	1448,2	14,882	0,1518	$4,214 \times 10^{-5}$	1	$0,0310 \times 10^{-1}$
47,88	47880	478,8	4,882	$1,3558 \times 10^{-3}$	32,174	1

Kinematic Viscosity is density dependent and therefore always related to the density of a fluid. The unit of measure is square meter per second [m²/s]. A kinematic viscosity of one m²/s is equal to the kinematic viscosity of a homogenous fluid with a dynamic viscosity of one Pascal-second and a density of 1 kg/cubic meter. The unit Stokes (St) is no longer valid.

The Engler-Degree [E] is not a unit in the meaning of the „laws of mass unit measurements“. To convert Engler-Degree into kinematic viscosity ν the following equation can be used:

$$\nu = \left(7,32 E - \frac{6,31}{E} \right) 10^{-6} \text{ m}^2 / \text{s} \quad (\text{equation 14.1})$$

Conversion Table for Kinematic Viscosity Units

m²/s	cm²/s	mm²/s	m²/h	St	cSt	ft²/s	ft²/h
1	10^5	10^6	3600	10^5	10^6	10,764	$3,875 \times 10^4$
10^{-4}	1	100	0,36	1	100	$1,0764 \times 10^{-3}$	3,875
10^{-6}	10^{-2}	1	0,0036	0,01	1	$1,0764 \times 10^{-5}$	0,03875
$2,778 \times 10^{-4}$	2,778	277,8	1	2,778	277,8	$29,9 \times 10^{-4}$	10,764
10^{-4}	1	100	0,36	1	100	$1,0764 \times 10^{-3}$	3,875
10^{-6}	10^{-2}	1	0,0036	0,01	1	$1,0764 \times 10^{-5}$	0,03875
$9,2903 \times 10^{-2}$	929,03	92903	334,45	929,03	92903	1	3600
$0,25806 \times 10^{-4}$	0,25806	25,806	$9,2903 \times 10^{-2}$	0,25806	24,806	$2,778 \times 10^{-4}$	1

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